

Simulation Facility BraidwoodScenario Operating Test No.: **15-1 NRC**  
No.:**NRC 1**Examiners: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_Applicant: \_\_\_\_\_ SRO  
\_\_\_\_\_ ATC  
\_\_\_\_\_ BOP

Initial Conditions: IC-21

Turnover: Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Following completion of turnover, the Shift Manager requests that the BOP swap the 0A &amp; 0B WS pumps per BwOP WS-1 and WS-3 in preparation for surveillance testing on Unit 2.

Event No.	Malf. No.	Event Type*	Event Description
Preload	Trgset 1 "ZLO1HSMP025(3) == 0" Trg 1 "IMF ED04A"		Offsite power is lost on the main generator trip
1	None	N-BOP, US	Swap WS pumps
2	IMF NI08H 500 10	I-ATC, US TS-US	PR NI N-44 fails high
3	IMF RX03C 4.8	I-BOP, US	1B SG steam flow, 1FT-522, fails high
4	IMF CV05 600 5	C-ATC, US	Letdown line pressure controller 1PK-131 output fails low
5	IOR ZDI1WO01PA TRIP	C-BOP, US	1A Containment Chilled Water Pump trip
6	TH03B 5 60	TS-US	1B SG Tube Leak
7	None	R-ATC, US	1BwOA SEC-8 Fast Ramp
8	IMF TH03B 550	M-ALL	1B SGTR
9	Preload	C-ALL	Offsite power is lost on the main generator trip

(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

## SCENARIO OVERVIEW

Unit 1 is at 100% power, steady state, equilibrium xenon, BOL. Following completion of turnover, the Shift Manager requests that the BOP swap the 0A & 0B WS pumps per BwOP WS-1 and WS-3 in preparation for surveillance testing on Unit 2.

**After completing shift turnover and relief**, the BOP will swap the 0A & 0B WS pumps in accordance with BwOP WS-1 and WS-3. The 0B WS pump will be started and the 0A WS pump will be placed in standby.

**After swapping WS pumps**, a failure of power range N-44 lower detector will occur. The crew will take actions per hard card 1BwPR 1-10-RD & 1BwOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION" including defeating the channel functions. Technical Specifications 3.3.1 Conditions A, D & E apply.

**After the Power Range failure is addressed**, a failure of 1FT-522, 1B SG steam flow channel, will occur. The crew will take actions per hard card 1BwPR 1-15-SG & 1BwOA INST-2 "OPERATION WITH FAILED INSTRUMENT CHANNEL" and perform required actions. The crew will swap to an operable steam flow channel.

**After completion of steam flow failure actions**, letdown pressure controller, 1PK-131, output will fail low. The letdown pressure control valve, 1CV131, will close and letdown pressure will rise lifting the letdown line relief valve. The ATC will take manual control of letdown pressure controller per hard card 1BwPR 1-9-LD and restore letdown pressure. The crew may isolate letdown due to the lifting letdown relief valve. If letdown is isolated, it will be restored per BwOP CV-17.

**After the 1PK-131 controller failure is addressed**, the 1A Containment Chilled Water pump will trip resulting in a trip of the 1A Containment Chiller. The crew will start the standby 1B Chilled Water pump and Chiller per BwOP VP-1 after receiving a report that the 1A Chilled Water pump motor appears damaged. Containment pressure and temperature will slowly rise as a result of the loss of Containment Cooling. The US should reference Tech Spec 3.6.4 and 3.6.5 and place a priority to start the standby Cnmt Chiller.

**After the Containment Chilled Water malfunction has been addressed**, a 1B Steam Generator Tube Leak will be initiated. The crew will implement 1BwOA SEC-8 "STEAM GENERATOR TUBE LEAK." The crew should determine from the estimated leak size that a fast ramp to remove the unit from power is required and make preparations to ramp the unit off line using 1BwGP 100-4, POWER DESCENSION or 1BwOA PWR-1 "POWER REDUCTION." Technical Specifications 3.4.13 Condition B applies.

**After the SGTL has been addressed and the crew has ramped the unit sufficiently for a reactivity manipulation**, the 1B SGTL will degrade to a 550 gpm Steam Generator Tube Rupture. The crew will implement 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION." The crew will transition to 1BwEP-3 "SGTR."

The scenario is complete when the crew has terminated high head injection and established normal charging flow in 1BwEP-3.

### Critical Tasks

1. Identify the 1B SG as the ruptured SG and isolate prior to a transition to 1BwCA-3.1 is required. (Westinghouse – CT-18) (K/A number - EPE038EA1.32 importance 4.6/4.7)
2. Depressurize RCS to restore RCS inventory prior to 1B SG PORV or safety valve water release. (Westinghouse – CT-20) (K/A number - EPE038EA1.04 importance 4.3/4.1)

## SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-21, 100% power, steady state, equilibrium xenon.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Verify/place 0A and 0C VA plenums in service, 0B VA plenum in standby.
- Verify RM-11 on Grid 1.
- Monitor ruptured S/G status by using SimView file – SGTR.
- Run **caep “151 NRC 1 SETUP”** from disk and verify the following actuate:
  - **Trgset 1 “ZLO1HSMP025(3) == 0”**
  - **Trg 1 “IMF ED04A”**
- Provide examinees with turnover sheets.
- Verify SER and RM-11 printers are clear of data.
- Set Leak Tracker Program PPC point U9050 = 1.25 gpd.

**Event 1: Swap WS pumps.**

If dispatched as EO to observe WS pump swap, report 0B WS pump is ready for start, the pump has stable operating parameters once running. The stopped WS pump is not rotating backwards. Acknowledge the need to complete steps for aligning chemical injection.

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**Event 2: Power Range N-44 fails high.**

Insert **IMF NI08H 500 10** to fail N-44 lower detector high over 10 seconds.

Acknowledge as SM, entry into Tech Spec 3.3.1 Conditions A, D & E.

Acknowledge as SM, request for writing IR, performing on-line risk assessment and making appropriate notifications.

As SM, if requested for support for bypassing bistables in AEER, report that AEER bistables are not to be bypassed until work analyst and NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued.

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**ENSURE CONTROL RODS IN AUTO PRIOR TO INSERTING EVENT 3.**

**Event 3: Steam Flow detector 1FT-522 fails high.**

Insert **IMF RX03C 4.8** to fail 1B SG steam flow detector, 1FT-522, high.

As SM, acknowledge failure of 1FT-522, and requests for on-line risk assessment, maintenance support, and IR initiation.

As SM, acknowledge request for personnel notifications.

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**Event 4: Letdown line pressure controller 1PK-131 output fails low.**

Insert **IMF CV05 600 5** to fail 1CV131 controller to 600 psig over 5 seconds.

If dispatched as EO to investigate 1PT-131, wait three minutes and report no visible damage to 1PT-131.

If dispatched as EO to align excess letdown to the top of the VCT, insert the following:

- **MRF CV26remf 100** to open 1CV8482.
- **MRF CV27 0** to close 1CV8484.

Acknowledge as SM, the 1PK-131 failure, on-line risk assessment, requests for maintenance support, and IR requests.

**Event 5: 1A Containment Chilled Water pump trip.**

Insert **IOR ZD11WO01PA TRIP** to trip the 1A Containment Chilled Water pump.

After the 1A Chilled Water pump is tripped, DELETE override **DOR ZD11WO01PA**.

If dispatched as EO to investigate 1A Chilled Water pump breaker, wait 2 minutes and report the breaker tripped free. The 1A Cnmt Chiller breaker is open with NO flags.

If dispatched as EO to investigate 1A Chilled Water pump, wait 3 minutes and report the pump motor smells acrid and there is a haze above the motor (no fire). Cause of 1A Containment Chiller trip is EVAP LOW WATER FLOW.

If asked as EO, report 1TIS-WO018 reads 44°F.

As SM, acknowledge the trip of 1A Containment Chilled Water pump and Chiller, on-line risk assessment, maintenance support, and IR initiation. When notified, direct the crew to start the 1B Chiller remotely from the MCR rather than locally (reason is to limit time frame to restore Containment cooling).

As EO, provide local operator actions for starting the 1B Containment Chilled Water Pump and Chiller (BwOP VP-1):

- (step F.2) As EO, Oil Heater Breaker is on. If contacted as WEC supervisor, the WEC is tracking 1B Chiller Oil Heater energization time.
  - (step F.5) Pump suction pressure is 22 psig. WO Expansion Tank level is 55%.
  - (step F.7) 1WO005B is throttled. 1FIS-WO027 indicates 3000 gpm.
  - (step F.8) Chiller Oil level is 50% in sightglass.
  - (step F.9) Lamp test was satisfactory for all light bulbs.
  - (step F.10) Chiller oil temperature is in band and Low Oil Temp alarm NOT lit locally.
  - (step F.11) Electrical Demand Selector is in the 60% demand position.
  - (step F.12) LCD on the purge control unit displays "ADAPTIVE" mode.
  - (step F.13) RESET pushbutton has been depressed for 2 seconds, no trip lights lit.
  - (step F.15) IF asked to start the Chiller locally, report that the Local/Remote transfer switch is physically stuck in the REMOTE position (the intent is for the MCR to start the chiller per step F.16).
  - (step F.16) Report that as EO you are standing by the 1B Containment Chiller ready for a remote start (START/STOP Switch is in STOP; Local/Remote switch is in REMOTE).
  - (step F.17) The Program Timer Light at the Local Control Panel is lit.
  - Report that you will complete the remaining local steps (F.18 – F.30).
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**Event 6: 1B SG tube leak.**

Insert **IMF TH03B 8 gpm initial to 9 gpm final over 30 minutes** – 1B SGT at 8 gpm to 9 gpm over 30 minutes.

If called as Chemistry for 1B S/G sample, wait 15 minutes and report the estimated 1B S/G leakrate at 5 gpm.

If called as Chemistry a second time for 1B S/G sample, wait 10 minutes and report the estimated 1B S/G leakrate at 5 gpm.

Acknowledge as SM, procedure transitions, Tech Spec 3.4.13 Condition B entry, E Plan evaluation.

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**Event 7: Fast ramp of unit off line.**

To reset the SG blowdown panel trouble alarm, use the following:

Insert **IRF WD14 RESET**

As SM, acknowledge fast ramp requirement.

Acknowledge as Generation Dispatch, the initiation of ramp.

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**Event 8: 1B SGTR.**

Insert **IMF TH03B 550** to initiate a 550 gpm tube rupture in the 1B SG.

Acknowledge as SM: procedure transitions, E Plan evaluations, and STA request.

If asked, use SimView to close 1FW002A-C (in SimView, set FWV1FW002A/B/C = 0).

If asked, status of SAT 142-1 after sudden pressure trip, wait 2 minutes, then report deluge has initiated, NO fire exists.

Run **CAE DrainCCSurge.cae** if requested to isolate WM makeup and drain the CC surge tank.

Scenario <b>NRC 1</b>		Event 1
No:		No.
Event Description: Swap WS pumps		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>From turnover, swap 0A &amp; 0B WS pumps per BwOP WS-1 "STARTUP AND OPERATION OF THE NON-ESSENTIAL SERVICE WATER SYSTEM" and BwOP WS-3 "SHUTDOWN OF A NON-ESSENTIAL SERVICE WATER PUMP."</li> </ul>
	US	<ul style="list-style-type: none"> <li>Direct BOP to perform BwOP WS-1 and BwOP WS-3.</li> </ul>
	BOP	<p>Refer to BwOP WS-1, step 3.</p> <ul style="list-style-type: none"> <li>Direct EO to verify proper 0B WS pump bearing oil levels.</li> <li>Direct EO to perform Att. A to flush/clean 0B WS pump strainer.</li> <li>Direct EO to verify/open 0WS002B, 0B WS pump discharge valve.</li> <li>Start 0B WS pump at 0PM01J.</li> <li>Check for normal pump parameters.</li> <li>Direct EO to OPEN 0CFX401, 0B WS pump chem injection isolation valve.</li> </ul> <p>Refer to BwOP WS-3 (ALL 3 WS pumps are running).</p> <ul style="list-style-type: none"> <li>Direct EO to close 0CFX400, 0A WS pump chem injection isolation valve.</li> <li>Place the 0A WS pump control switch in PULL OUT at 0PM01J.</li> <li>Direct EO to verify that the 0A WS pump shaft stops rotating.</li> <li>Direct EO to verify proper 0A WS pump bearing oil levels.</li> <li>Direct EO to verify/open 0WS002A, 0A WS pump discharge valve.</li> <li>Place the 0A WS pump control switch in AFTER TRIP.</li> <li>Check 0A WS pump stop light ON.</li> <li>Direct EO to complete BwOP WS-3 step F.6 actions at Lake Screen House.</li> <li>Inform US that the WS pump swap is complete.</li> </ul>
	US	<ul style="list-style-type: none"> <li>Acknowledge report of WS pump swap.</li> <li>o Notify SM that WS pump swap is complete.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>o Monitor remainder of MCBs.</li> </ul>
<p><b>EXAMINER'S NOTE: After BwOP WS-1 &amp; WS-3 are complete and with Lead Examiner's concurrence, enter next event.</b></p>		

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Scenario <b>NRC 1</b>		Event 2
No:		No.
Event Description: Power Range N-44 fails high.		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator PWR RNG FLUX RATE RX TRIP ALERT (1-10-C3)</li> <li>• Annunciator PWR RNG CHANNEL DEV (1-10-C4)</li> <li>• Annunciator PWR RNG LOWER DET FLUX DEV HIGH (1-10-B4)</li> <li>• Control rod inward motion.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Determine PR channel N-44 failing high.</li> <li>• Verify turbine load stable, then place control rods in manual (may use hard card 1BwPR 1-10-RD). <ul style="list-style-type: none"> <li>○ Reference BwARs as time permits.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Implement 1BwOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION," Attachment A "PR CHANNEL FAILURE" and direct operator action.</li> <li>• Notify SM of PR N-44 failure.</li> <li>• Notify SM to evaluate for Emergency Plan.</li> </ul>
	ATC BOP	<ul style="list-style-type: none"> <li>• Check rod control status. <ul style="list-style-type: none"> <li>• Rod bank select switch in manual (performed previously).</li> </ul> </li> <li>• Check for rod stop. <ul style="list-style-type: none"> <li>• Annunciator PWR RNG FLUX HIGH ROD STOP (1-10-B5) – LIT.</li> <li>• Place rod stop bypass switch to N-44 at 1PM07J.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify <math>T_{AVE} - T_{REF}</math> stable &amp; within 1°F. If NOT, restore <math>T_{AVE} - T_{REF}</math> to within 1°F: <ul style="list-style-type: none"> <li>○ Withdraw control rods.</li> <li>○ Adjust RCS boron concentration.</li> <li>○ Adjust turbine load.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Check SG levels normal and stable.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Bypass/defeat PR channel functions at 1PM07J: <ul style="list-style-type: none"> <li>• N-44 upper section detector current comparator.</li> <li>• N-44 lower section detector current comparator.</li> <li>• N-44 power mismatch bypass.</li> <li>○ N-44 rod stop bypass (performed previously).</li> <li>• N-44 comparator channel defeat.</li> </ul> </li> </ul>

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Scenario <b>NRC 1</b>		Event <b>2</b>
No:		No.
Event Description: Power Range N-44 fails high.		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Reset flux rate trip alarm for N-44 at 1PM07J.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Place computer points in test: <ul style="list-style-type: none"> <li>• N0047</li> <li>• N0048</li> <li>• U1143</li> </ul> </li> <li>• Delete computer point from scan: <ul style="list-style-type: none"> <li>• N0052A</li> </ul> </li> <li>• Place N44 input to DEH in Test.</li> </ul>
	US	<ul style="list-style-type: none"> <li>○ As directed by the Shift Manager: <ul style="list-style-type: none"> <li>○ Locally bypass bistables for affected channel.</li> <li>○ Trip bistables for affected PR channel.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>○ Locally bypass bistables for failed NI protection channel functions. <ul style="list-style-type: none"> <li>• Access failed NI protection panel.</li> <li>• Verify bypass enable key lock switch is in normal.</li> <li>• Verify following individual bypass function switches in normal and bypass LEDs off: <ul style="list-style-type: none"> <li>• SWITCH #2 P10 PERMISSIVE</li> <li>• SWITCH #3 POSITIVE RATE TRIP</li> <li>• SWITCH #4 OVER POWER TRIP-LOW</li> <li>• SWITCH #5 OVER POWER TRIP-HIGH</li> <li>• SWITCH #6 OVER POWER ROD STOP</li> <li>• SWITCH #7 P8 PERMISSIVE</li> </ul> </li> <li>• Energize failed channel bypass panel by pressing both breaker to "on". <ul style="list-style-type: none"> <li>• Non-safety breaker ON.</li> <li>• Safety breaker ON.</li> </ul> </li> <li>• Insert key in bypass enable key lock and turn key to BYPASS position.</li> <li>• Verify bypass enable LED is lit.</li> <li>• Place bypass function switches in bypass and verify bypass LEDs are lit. <ul style="list-style-type: none"> <li>• SWITCH #2 P10 PERMISSIVE</li> <li>• SWITCH #3 POSITIVE RATE TRIP</li> <li>• SWITCH #4 OVER POWER TRIP-LOW</li> <li>• SWITCH #5 OVER POWER TRIP-HIGH</li> <li>• SWITCH #6 OVER POWER ROD STOP</li> <li>• SWITCH #7 P8 PERMISSIVE</li> </ul> </li> </ul> </li> </ul>

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Scenario <b>NRC 1</b>		Event No. <b>2</b>
Event Description: Power Range N-44 fails high.		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>○ Locally bypass AEER bistables for PR N-44 to bypass.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Select operable channel (other than 1D) to loop <math>\Delta T</math> recorder.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if rod control can be placed in auto. <ul style="list-style-type: none"> <li>• C-5 not lit.</li> <li>• <math>T_{AVE} - T_{REF}</math> stable and within 1°F.</li> <li>• Place control rods in auto.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Determine Tech Spec 3.3.1 Conditions A, D, and E are applicable.</li> <li>○ Enter/exit Tech Spec 3.4.1 if PZR pressure dropped below 2209 psig during auto rod steps.</li> <li>• Contact SM to perform risk assessment, initiate IR, evaluate reactivity screening, make notifications and contact appropriate personnel to investigate/correct instrument failure.</li> </ul>
		<p><b>EXAMINER'S NOTE: (1) After the actions for PRNI N-44 are complete and with Lead Examiner's concurrence, enter next event.</b></p> <p><b>(2) Ensure rods are back in AUTO prior to inserting the next event.</b></p>

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Scenario <b>NRC 1</b>		Event <b>3</b>
No:		No.
Event Description: Steam flow detector, 1FT-522, failure		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator S/G 1B FLOW MISMATCH FW FLOW LOW (1-15-B4)</li> <li>• 1FI-522A steam flow indicator fails high.</li> <li>• 1B SG level meters, 1LI-527/528/529/557, indicate rising level.</li> <li>○ Annunciator S/G 1B LEVEL DEVIATION HIGH LOW (1-15-B9)</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Determine 1FT-522 failed high.</li> <li>• Place 1B FRV (1FW520) in manual and restore SG level per hard card 1BwPR 1-15-SG.</li> <li>• Place master feed pump speed control in manual.</li> <li>• Select operable steam flow channel.</li> <li>○ Reference BwARs.as time permits.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-2 "OPERATION WITH FAILED INSTRUMENT CHANNEL."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Enter/implement 1BwOA INST-2 "OPERATION WITH FAILED INSTRUMENT CHANNEL," Attachment H, "STEAM FLOW CHANNEL FAILURE" and direct operator actions of 1BwOA INST-2.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Stabilize 1B SG level (actions to stabilize per hard card 1BwPR 1-15-SG initially, then 1BwOA INST-2).</li> <li>○ If SG level abnormal: <ul style="list-style-type: none"> <li>○ Control 1B FRV (1FW520) in manual.</li> <li>○ Place master feed pump speed control in manual.</li> <li>○ Verify adequate feedwater DP (1BwGP 100-3A9).</li> <li>○ Restore SG level(s).</li> </ul> </li> <li>• Select operable steam flow channel (1BwPR 1-15-SG action):</li> <li>• Establish/verify automatic SG level control.</li> <li>• Verify steam pressure channels normal.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>○ Ramp 5 MW down at 5 MW/minute (may be performed based on crew discretion).</li> </ul>

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Scenario <b>NRC 1</b>		Event 3
No:		No.
Event Description: Steam flow detector, 1FT-522, failure		
Time	Position	Applicant's Actions or Behavior
		<b>EXAMINER'S NOTE: 1BwOA PRI-16 "RESPONSE TO OVERPOWER CONDITION" may also be used to lower Rx power below 100%.</b>
	CREW	<ul style="list-style-type: none"> <li>• Check reactor power &lt;100%: <ul style="list-style-type: none"> <li>• PPC 10 min. calorimetric.</li> <li>• Computer point (U0923)</li> <li>• NIs.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify SM/maintenance to investigate/correct the failed steam flow channel: <ul style="list-style-type: none"> <li>• Determine Tech Specs are NOT applicable.</li> <li>• Contact SM to perform risk assessment, initiate IR, reactivity screening, notify QNE and contact maintenance to investigate/correct instrument failure.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: After the actions for the steam flow failure are complete and with Lead Examiner's concurrence, insert next event.</b>

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Scenario <b>NRC 1</b>		Event <b>4</b>
No:		No.
Event Description: <b>1PK-131 output fails low</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator LTDWN HX OUTLT PRESS HIGH (1-8-B5)</li> <li>• 1FI-132, letdown line flow, lowering.</li> <li>• 1PI-131, letdown line pressure, rising.</li> <li>○ Annunciator LP LTDWN RLF TEMP HIGH (1-9-B1)</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Recognize 1PK-131 failed.</li> <li>• Place 1PK-131 in manual and adjust letdown pressure to pre-failed value per hard card 1BwPR 1-9-LD at 1PM05J.</li> <li>○ Refer to BwARs as time permits.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Direct/ensure ATC takes manual control of 1PK-131 and returns letdown pressure to normal.</li> <li>• Inform SM of 1PK-131 failure.</li> <li>○ Direct ATC to isolate letdown.</li> </ul>
	ATC	<p>Perform the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Maintain letdown flow and pressure by operating 1PK-131 in manual. <ul style="list-style-type: none"> <li>○ May take manual control of 1TK-130.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> </ul>
		<p><b>EXAMINER'S NOTE: (1) The crew may elect to isolate letdown based on letdown relief valve lifting. Following letdown isolation, the crew may elect to establish excess letdown or re-establish normal letdown. The steps for restoring normal letdown are in italics below.</b></p> <p><b>(2) The crew may use hard card 1BwPR 1-9-LD to isolate letdown.</b></p>
	<i>BOP</i>	<ul style="list-style-type: none"> <li>○ <b><i>Establish normal letdown per BwOP CV-17:</i></b> <ul style="list-style-type: none"> <li>○ <i>Verify/close 1CV8149A/B/C.</i></li> <li>○ <i>Verify CC aligned to letdown HX (was previously aligned).</i></li> <li>○ <i>Place 1CV131 controller in manual at 40% demand.</i></li> <li>○ <i>Place 1CC130 controller in manual at 60% demand.</i></li> </ul> </li> </ul>

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Scenario No:	<b>NRC 1</b>	Event No:	4
Event Description:	1PK-131 output fails low		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>○ <i>Verify/open 1CV8152/8160.</i></li> <li>○ <i>Verify/open 1CV459/460.</i></li> <li>○ <i>Verify/open 1CV8324A &amp; 1CV8389A.</i></li> <li>○ <i>Verify/open 1CV381B (BTRS Mode Selector Switch OFF light LIT).</i></li> <li>○ <i>Verify/close 1CV381A (BTRS Mode Selector Switch OFF light LIT).</i></li> <li>○ <i>Verify/open 1CV8401A.</i></li> <li>○ <i>Verify/close 1CV8145.</i></li> <li>○ <i>Verify/open 1CV8147.</i></li> <li>○ <i>Open 1CV8105/8106.</i></li> <li>○ <i>Adjust charging flow to approx. 100 gpm w/seal injection 8-10 gpm per RCP.</i></li> <li>○ <i>Open 1CV8149A/B/C and control 1CV131 to maintain letdown pressure 360-380 psig.</i></li> <li>○ <i>Control 1CC130 controller to maintain letdown temperature 90-115°F.</i></li> <li>○ <i>Place controllers in auto.</i></li> <li>○ <i>Verify 1PR06J in service.</i></li> <li>○ <i>Verify proper operation of RMCS during VCT makeup.</i></li> <li>○ <i>Proper flow indicated on PW/Total Flow (1FT-0111) and Boric Acid Flow (1FT-0110).</i></li> <li>○ <i>Restore PZR level to program.</i></li> </ul>	
		<b>The steps for establishing excess letdown are in italics below.</b>	
	<i>BOP</i>	<ul style="list-style-type: none"> <li>○ <b><i>Establish excess letdown per BwOP CV-15 "EXCESS LETDOWN OPERATIONS".</i></b></li> <li>○ <i>Prerequisite if excess letdown is placed in service, reactor power is maintained less than or equal to 99.8%.</i></li> <li>○ <i>Verify open 1CV8100/8112.</i></li> <li>○ <i>Open 1CC9437A/B.</i></li> <li>○ <i>Verify/closed 1CV123.</i></li> <li>○ <i>Verify 1CV8143 C/S in VCT position.</i></li> <li>○ <i>Open 1RC8037A/B/C/D.</i></li> <li>○ <i>Open 1CV8153A(B).</i></li> <li>○ <i>Slowly open 1CV123 while maintaining excess letdown outlet temperature &lt;165F.</i></li> </ul>	
		<b>EXAMINER'S NOTE: After the actions for the 1PK-131 failure are complete and with Lead Examiner's concurrence, insert next event.</b>	

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Scenario <b>NRC 1</b>		Event 5
No:		No.
Event Description: 1A Containment Chilled Water pump trip		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator CNMT CHLR UNIT TROUBLE (0-33-D3)</li> <li>• 1A Containment Chiller trip light – LIT.</li> <li>• 1A Chilled Water pump trip light – LIT.</li> </ul>
	US	<ul style="list-style-type: none"> <li>○ Direct BOP to respond to BwAR 0-33-D3.</li> <li>• Direct BOP to start 1B Containment Chilled Water Pump and Chiller.</li> <li>• Notify SM of 1A Cnmt Chilled Water pump failure.</li> <li>○ Evaluate Containment conditions against Tech Specs 3.6.4 and 3.6.5.</li> <li>○ Notify SM to evaluate for Emergency Plan.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Determine 1A Cnmt Chiller and Chilled Water pump tripped.</li> <li>• Reference BwAR 0-33-D3 (dispatch EO to Cnmt Chiller/Chilled Water pump).</li> <li>○ Place 1A Chilled Water Pump/Chiller C/S in PTL.</li> <li>• Start 1B Containment Chilled Water Pump and Chiller per BwOP VP-1.</li> </ul>
	BOP	<p><b>BwOP VP-1 Actions:</b></p> <ul style="list-style-type: none"> <li>• Direct EO to locally energize oil heaters and notifies WEC to track energization time of heaters-verify heaters energized for 1B VP chiller.</li> <li>• Verify OPEN: <ul style="list-style-type: none"> <li>• 1SX112B, Cnmt Chiller SX Inlet Vlv.</li> <li>• 1SX114B, Cnmt Chiller SX Outlet Vlv.</li> <li>• 1SX147B, Cnmt Chiller SX Bypass Vlv.</li> <li>• 1SX016B, RCFC SX Supply Vlv @ 1PM06J.</li> <li>• 1SX027B, RCFC SX Return Vlv @ 1PM06J.</li> </ul> </li> <li>• Verify OPEN @ 1PM06J: <ul style="list-style-type: none"> <li>• 1WO006B, 1B + 1D Chill Wtr Inlet Cnmt Isol Vlv.</li> <li>• 1WO020B, 1B + 1D Chill Wtr Outlet Cnmt Isol Vlv.</li> <li>• 1WO056B, 1B + 1D Chill Wtr Outlet Cnmt Isol Vlv.</li> </ul> </li> <li>• Direct local EO to perform steps F.5 (verify Pump suction pressure and Expansion Tank level).</li> <li>• Start 1WO01PB, Chilled Water Pump.</li> <li>• Direct EO to locally complete BwOP VP-1 steps F.7 - F.13.</li> <li>• Verify/place 1B Byp Isol Vlv 1SX147B in AUTO at 0PM02J.</li> <li>• Start the 1B Containment Chiller from the MCR:</li> </ul>

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Scenario No:	<b>NRC 1</b>	Event No:	5
Event Description:	1A Containment Chilled Water pump trip		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• Direct EO to locally verify START/STOP switch in STOP and Local/Remote switch in Remote and is prepared to record initial data locally.</li> <li>• Place 1WO01CB, Chiller 1B Control Switch, at 0PM02J to AFTER CLOSE.</li> <li>• Direct EO to locally complete steps F.17 to F.30.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> </ul>	
		<p><b>EXAMINER'S NOTE: After the actions for the Containment Chilled Water pump trip are complete and with Lead Examiner's concurrence, insert next event.</b></p>	

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Scenario <b>NRC 1</b>		Event <b>6</b>
No:		No.
Event Description: <b>1B SG Tube Leak</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• RM-11 Secondary rad monitor alarms/levels rising: <ul style="list-style-type: none"> <li>○ SG BLDN – 1PR08J.</li> <li>○ SJAE/GLAND STEAM EXHAUST – 1PR027J.</li> <li>○ 1B MAIN STEAM LINE – 1AR022J/23J.</li> </ul> </li> <li>○ PZR level dropping.</li> <li>○ PZR pressure dropping.</li> <li>○ Charging/letdown mismatch.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>○ Refer to BwAR 1-1PR27J for operator actions.</li> <li>○ Refer to BwAR 1-1PR08J for operator actions.</li> <li>○ Refer to BwAR 1-1AR22/23J for operator actions.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA SEC-8 “STEAM GENERATOR TUBE LEAK.”</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Implement 1BwOA SEC-8 and direct operator actions.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Notify SM of SG leakage.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check SI Status: <ul style="list-style-type: none"> <li>○ PZR pressure <math>\leq</math> 1829 psig.</li> <li>○ Steamline pressure <math>&lt;</math> 640 psig.</li> <li>○ CNMT pressure <math>\geq</math> 3.4 psig.</li> </ul> </li> <li>• Maintain PZR level: <ul style="list-style-type: none"> <li>• Throttle 1CV121 &amp; 1CV182 as necessary.</li> </ul> </li> <li>• Check PZR level stable or rising. <ul style="list-style-type: none"> <li>○ If PZR level lowering, reduce letdown flow to 75 gpm.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Monitor VCT level. <ul style="list-style-type: none"> <li>• Verify makeup is adequate to maintain VCT level.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Minimize Secondary Contamination. <ul style="list-style-type: none"> <li>• Dispatch operators to perform BwOP MS-13 “OPERATION WITH SG TUBE LEAKAGE.”</li> </ul> </li> </ul>

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Scenario <b>NRC 1</b>		Event <b>6</b>
No:		No.
Event Description: <b>1B SG Tube Leak</b>		
Time	Position	Applicant's Actions or Behavior
	US	<ul style="list-style-type: none"> <li>• Notify RP to monitor rad levels and quantify release.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify leaking SG (1B). <ul style="list-style-type: none"> <li>• Trend Main Steam Line monitors. <ul style="list-style-type: none"> <li>○ Dropping feed flow with stable SG level.</li> <li>○ Unexpected rise in any NR SG level.</li> <li>○ Chemistry reports high activity via sample or N-16 monitor.</li> </ul> </li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Determine SG tube leak rate.</li> <li>• Estimate leak rate. <ul style="list-style-type: none"> <li>○ Computer point U9052 or SG Leak Tracker Program on PPC.</li> <li>○ Charging/letdown/RCP leakoff flow balance.</li> <li>○ Change in VCT level.</li> <li>○ Grab sample.</li> <li>○ 1BwOS SG-1 SG, Pri to Sec Leakage Estimation.</li> </ul> </li> <li>• Check total RCS to secondary leak rate &gt; 10 gpm – NO.</li> <li>• Perform 1BwOSR 3.4.13.1 while continuing with 1BwOA SEC-8.</li> <li>• Check 1PR27J, SJAE rad monitor, operable.</li> <li>• Trend SG leakrate. <ul style="list-style-type: none"> <li>• Notify Chemistry to sample SGs.</li> <li>• Check PPC point U9052 responding to plant conditions (1PR08J/N-16 rad monitors).</li> <li>• Trend leakrate every 15 minutes.</li> </ul> </li> <li>• Determine if a shutdown is required. <ul style="list-style-type: none"> <li>• SG leakrate &lt; 100 gpd – NO - GO TO step 9.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Confirm SG leak rate (<b>step 9</b>).</li> <li>• At least 2 independent indications – TREND in the same direction. <ul style="list-style-type: none"> <li>○ Main steam line radiation monitors.</li> <li>○ SJAE/GS Exhaust radiation monitor.</li> <li>○ SG Blowdown radiation monitor.</li> <li>○ N-16 radiation monitors.</li> </ul> </li> </ul>

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Scenario <b>NRC 1</b>		Event <b>6</b>
No:		No.
Event Description: <b>1B SG Tube Leak</b>		
Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> <li>• Initiate Unit Shutdown. <ul style="list-style-type: none"> <li>• Check leak rate &lt; 100 gpd – NO.</li> <li>• Reduce power to &lt; 50% within 1 hour (Rapid Power Reduction - 1BwGP 100-4T3). <ul style="list-style-type: none"> <li>○ Shutdown Unit to MODE 3 within 2 hours of reaching 50% power. Continue shutdown using 1BwGP 100-4 and 5.</li> </ul> </li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Determine Tech Spec 3.4.13 Condition B applies.</li> </ul>
		<b>EXAMINER'S NOTE: At this point, the crew should begin preparations for shutting down the unit. The remaining actions of 1BwOA SEC-8 would be performed after the reactor is shutdown, if an SI does NOT actuate.</b>
		<b>EXAMINER'S NOTE: The fast ramp due to the SG tube leak is event 7. See the following pages.</b>

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Scenario <b>NRC 1</b>		Event <b>7</b>
No:		No.
Event Description: <b>1BWOA SEC-8 Fast Ramp</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Determine from 1BWOA SEC-8, a fast ramp load drop is required.</li> </ul>
	US	<ul style="list-style-type: none"> <li>○ Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACTIVITY, AND POST JOB BRIEFINGS" for load ramp.</li> <li>○ Perform pre-job brief using the Emergent Ramp Reactivity Summary Sheet (under the NSO desk glass) for load ramp.</li> <li>○ Inform SM of the 1BWOA SEC-8 fast ramp.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Review Operator Aid for 1BWOA SEC-8 Fast Ramp reactivity plan.</li> <li>• Review applicable Prerequisites, Precautions, and Limitations and Actions of 1BwGP 100-4.</li> </ul>
		<b>EXAMINER'S NOTE: The following step may be repeated as necessary to borate the RCS during the power descension.</b>
	ATC	<p><b>BwOP CV-6 Attachment A, borate in automatic, via hard card.</b> Perform the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Verify rod position and boron concentration.</li> <li>• Determine required boric acid volume. <ul style="list-style-type: none"> <li>○ Refer to operator aid for required boric acid addition.</li> </ul> </li> <li>• Determine desired boric acid flow rate.</li> <li>• Perform the following at 1PM05J: <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters (as required). <ul style="list-style-type: none"> <li>• Set 1FK-110 BA Flow Controller to desired boration rate.</li> <li>• Set 1FY-0110 BA Blender Predet Counter to desired volume.</li> <li>• Place MAKE-UP MODE CONT SWITCH to STOP position.</li> <li>• Place MODE SELECT SWITCH to BORATE position.</li> <li>• Place MAKE-UP MODE CONT SWITCH to START.</li> </ul> </li> <li>• Verify proper operation of valves and BA transfer pump (1CV110B open, Boric Acid Transfer Pump running, 1CV110A throttles open, proper BA flow indicated on recorder). <ul style="list-style-type: none"> <li>○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level.</li> </ul> </li> <li>• When desired boration achieved, place RMCS M/U CONT switch to STOP.</li> <li>• Verify 1CV110B closed, 1CV110A closed and Boric Acid Transfer Pump stopped.</li> </ul> </li> </ul> <p>OR</p>

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Scenario <b>NRC 1</b>		Event <b>7</b>
No:		No.
Event Description:		1BwOA SEC-8 Fast Ramp
Time	Position	Applicant's Actions or Behavior
		<p><b>BwOP CV-6 Attachment A, batch boration, via hard card.</b> Perform the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters (as required).</li> <li>● Open 1CV110B.</li> <li>● Open 1CV110A.</li> <li>● Start the BA Transfer pump.</li> <li>○ If desired, adjust 1LK-112, VCT level controller, setpoint to control VCT level.</li> <li>● When desired amount of BA has been added, stop the BA Transfer Pump.</li> <li>● Close 1CV110A.</li> <li>● Close 1CV110B.</li> <li>○ Adjust 1LK-112, VCT level controller, setpoint to desired value.</li> <li>● Place 1CV110A/B to AUTO.</li> <li>● Record boration in Unit log.</li> <li>● Perform BwOP CV-7 to return RMCS to automatic.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>● Lower turbine load at 1PM02J or OWS drop 210 by performing the following: <ul style="list-style-type: none"> <li>● Select SETPOINT.</li> <li>● Enter desired MWs into REF DEMAND window.</li> <li>● Select ENTER.</li> <li>● Verify correct value in REFERENCE DEMAND window.</li> <li>● Enter desired MW/min into the RATE window.</li> <li>● Select ENTER.</li> <li>● Select EXIT.</li> <li>● Select GO/HOLD.</li> <li>● Verify GO/HOLD button illuminates.</li> <li>● Verify HOLD illuminated RED.</li> <li>● Inform crew of pending ramp with an UPDATE.</li> <li>● Select GO.</li> <li>● Verify GO illuminates RED.</li> <li>● Verify main turbine load begins to lower.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>● Monitor reactor power and turbine load lowering.</li> <li>● Monitor NIs, Tave, ΔI, PZR pressure/level at 1PM05J.</li> <li>● Monitor MWe and DEHC system response at 1PM02J or OWS drop 210.</li> <li>● During boration, monitor the following at 1PM05J and PPC: <ul style="list-style-type: none"> <li>○ Monitor VCT level.</li> </ul> </li> </ul>

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Scenario No:	<b>NRC 1</b>	Event No:	7
Event Description:	1BwOA SEC-8 Fast Ramp		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>○ Monitor BA predet counter.</li> <li>○ Verify boration auto stops at preset value.</li> <li>○ Return Reactor Makeup Control System to automatic at current boron concentration.</li> </ul>	
		<b>EXAMINER'S NOTE: The crew may use 1BwOA PWR-1 "POWER REDUCTION" as the guidance to perform the fast ramp. Steps in italics below.</b>	
	<i>CREW</i>	<b><i>1BwOA PWR-1 "POWER REDUCTION"</i></b> <ul style="list-style-type: none"> <li>• <i>Request SM evaluation of Emergency Plan conditions.</i></li> <li>• <i>Perform a reactivity summary brief.</i></li> <li>• <i>Check control rods in auto.</i></li> <li>• <i>Energize PZR backup heaters, as necessary.</i></li> <li>• <i>Perform boration, as time permits, prior to the ramp per the following:</i> <ul style="list-style-type: none"> <li>○ <i>Borate per Op Aid guidance.</i></li> <li>○ <i>As directed by the SM/designee.</i></li> </ul> </li> <li>• <i>Program/start ramp not to exceed 60 mw/min with DEHC in auto (DEHC graphic 5501):</i> <ul style="list-style-type: none"> <li>• <i>SELECT setpoint.</i></li> <li>• <i>ENTER desired load into REF DEMAND window.</i></li> <li>• <i>SELECT LEFT ENTER.</i></li> <li>• <i>VERIFY the correct value appears in the REFERENCE DEMAND window.</i></li> <li>• <i>ENTER desired MW/MIN ramp rate into the RATE window.</i></li> <li>• <i>Verify the correct value appears in the RATE window.</i></li> <li>• <i>SELECT RIGHT ENTER.</i></li> <li>• <i>Notify Control Room team of the pending ramp.</i></li> <li>• <i>SELECT GO/HOLD.</i></li> <li>• <i>VERIFY GO/HOLD illuminates orange.</i></li> <li>• <i>VERIFY HOLD indicator illuminates red.</i></li> <li>• <i>SELECT GO.</i></li> <li>• <i>VERIFY GO indicator illuminates red while the main turbine ramps.</i></li> <li>• <i>VERIFY main turbine load begins to drop.</i></li> </ul> </li> <li>• <i>Notify TSO.</i></li> <li>• <i>Check PZR pressure controlling at or trending to 2235 psig.</i></li> <li>• <i>Check PZR level controlling at or trending to program level.</i></li> </ul>	

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Scenario No:	<b>NRC 1</b>	Event No:	7
Event Description:	1BwOA SEC-8 Fast Ramp		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• <i>Maintain Tave within 4°F of Tref.</i></li> <li>• <i>Check SG NR level.</i></li> <li>• <i>Notify Chemistry and RP of ramp in progress</i></li> <li>• <i>Notify SM to perform risk assessment, initiate IR, reactivity screening, notify QNE and notify other personnel.</i></li> </ul>	
		<b>EXAMINER'S NOTE: After measurable change in power (approx. 10 min.) and with Lead Examiner's concurrence, insert next event.</b>	

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Scenario <b>NRC 1</b>		Event 8 & 9
No:		No.
Event Description: 1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• RM-11 Secondary rad monitor alarms/levels rising. <ul style="list-style-type: none"> <li>○ SJAE/GLAND STEAM EXHAUSTER – 1PR027J.</li> <li>○ 1B/1C MAIN STEAM LINE – 1AR022J/23J.</li> </ul> </li> <li>• PZR level dropping.</li> <li>• PZR pressure dropping.</li> <li>• Charging/letdown mismatch.</li> </ul>
	CREW	Identify entry conditions for 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION."
	ATC	<ul style="list-style-type: none"> <li>• Insert manual reactor trip and actuate SI as directed.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Enter/implement 1BwEP-0 and direct operator actions of 1BwEP-0 to establish the following conditions:</li> </ul>
	ATC	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>• Verify reactor trip: <ul style="list-style-type: none"> <li>• Rod bottom lights - ALL LIT.</li> <li>• Reactor trip &amp; Bypass breakers – OPEN.</li> <li>• Neutron flux – DROPPING.</li> </ul> </li> </ul>
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM02J: <ul style="list-style-type: none"> <li>• Verify turbine trip: <ul style="list-style-type: none"> <li>• All Turbine throttle valves – CLOSED.</li> <li>• All Turbine governor valves – CLOSED.</li> </ul> </li> </ul>
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J: <ul style="list-style-type: none"> <li>• Verify power to 4KV busses: <ul style="list-style-type: none"> <li>• ESF Buses – BOTH ENERGIZED.</li> </ul> </li> </ul>
	CREW	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>• Check SI Status:</li> </ul>

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Scenario No:	<b>NRC 1</b>	Event No:	8 & 9
Event Description:	1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• SI First OUT annunciator – LIT.</li> <li>• SI ACTUATED Permissive Light – LIT.</li> <li>• SI Equipment – AUTOMATICALLY ACTUATED: <ul style="list-style-type: none"> <li>○ Either SI pump – RUNNING.</li> <li>○ Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.</li> </ul> </li> <li>• Manually actuate SI at 1PM05J &amp; 1PM06J.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>▪ Direct BOP to perform Attachment B of 1BwEP-0.</li> </ul>	
		<b>EXAMINER'S NOTE: US and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.</b>	
	BOP	<p><b>1BwEP-0 ATTACHMENT B:</b></p> <ul style="list-style-type: none"> <li>• Verify FW isolated at 1PM04J. <ul style="list-style-type: none"> <li>• FW pumps – TRIPPED.</li> <li>• FW isolation monitor lights – LIT (lights de-energized).</li> <li>• FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C (lights de-energized).</li> </ul> </li> <li>• Verify DGs running at 1PM01J: <ul style="list-style-type: none"> <li>• DGs – BOTH RUNNING.</li> <li>• 1SX169A/B OPEN.</li> <li>• Dispatch operator to monitor DGs operation.</li> </ul> </li> <li>• Verify Generator Trip at 1PM01J: <ul style="list-style-type: none"> <li>• OCB 1-8 and 7-8 open.</li> <li>• PMG output breaker open.</li> </ul> </li> <li>• Verify Control Room ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• VC Rad Monitors – loss of power (dispatch EO to locally verify VV/VL/VW fans tripped).</li> <li>• Operating VC train equipment – RUNNING. <ul style="list-style-type: none"> <li>• 0B Supply fan</li> <li>• 0B Return fan</li> <li>• 0B M/U fan</li> <li>• 0B Chilled water pump</li> <li>• 0B Chiller</li> </ul> </li> <li>• Operating VC train dampers – ALIGNED. <ul style="list-style-type: none"> <li>• M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.</li> <li>• 0B VC train M/U filter light – LIT.</li> </ul> </li> </ul> </li> </ul>	

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Scenario <b>NRC 1</b>		Event No. 8 & 9
Event Description: 1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• 0VC09Y – OPEN.</li> <li>• 0VC313Y – CLOSED.</li> <li>• Operating VC train Charcoal Absorber aligned for train B.</li> <li>• 0VC44Y – CLOSED.</li> <li>• 0VC05Y – OPEN.</li> <li>• 0VC06Y – OPEN.</li> <li>• Control Room pressure greater than +0.125 inches water on 0PDI-VC038 (meter de-energized, dispatch EO to perform BwOP VC-14).</li> <li>• Verify Auxiliary Building ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• Two inaccessible filter plenums aligned. <ul style="list-style-type: none"> <li>• Plenum A: <ul style="list-style-type: none"> <li>• 0VA03CB – RUNNING.</li> <li>• 0VA023Y – OPEN.</li> <li>• 0VA436Y – CLOSED.</li> </ul> </li> <li>• Plenum C: <ul style="list-style-type: none"> <li>• 0VA03CF – RUNNING.</li> <li>• 0VA072Y – OPEN.</li> <li>• 0VA438Y – CLOSED.</li> </ul> </li> </ul> </li> </ul> </li> <li>• Verify FHB ventilation aligned for emergency operation at 0PM02J: <ul style="list-style-type: none"> <li>• 0VA04CB – RUNNING.</li> <li>• 0VA055Y – OPEN.</li> <li>• 0VA062Y – OPEN.</li> <li>• 0VA435Y – CLOSED.</li> </ul> </li> <li>• Trip all running HD pumps (no power).</li> <li>• Initiate periodic monitoring of Spent Fuel Cooling.</li> <li>• Notify US Attachment B complete/manual actions taken.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS pumps running at 1PM05J/1PM06J: <ul style="list-style-type: none"> <li>• BOTH CV pumps – RUNNING.</li> <li>• BOTH RH pumps – RUNNING.</li> <li>• BOTH SI pumps – RUNNING.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify the following at 1PM06J: <ul style="list-style-type: none"> <li>• RCFCs running in accident mode. <ul style="list-style-type: none"> <li>• Group 2 RCFC accident mode status light lit.</li> </ul> </li> <li>• CNMT Phase A valves closed.</li> </ul> </li> </ul>

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Scenario <b>NRC 1</b>		Event 8 & 9
No:		No.
Event Description: 1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• Perform the following at 1PM06J: <ul style="list-style-type: none"> <li>• Verify Cnmt Vent isolation: <ul style="list-style-type: none"> <li>• Group 6 Cnmt Vent Isol monitor lights – LIT.</li> </ul> </li> <li>• Verify AF system: <ul style="list-style-type: none"> <li>• BOTH AF pumps – RUNNING.</li> <li>• AF isolation valves – 1AF13A-H OPEN.</li> <li>• AF flow control valves - 1AF005A-D throttled OPEN.</li> </ul> </li> <li>• Verify CC pumps running: <ul style="list-style-type: none"> <li>• BOTH CC pumps – RUNNING.</li> </ul> </li> <li>• Verify SX pumps running: <ul style="list-style-type: none"> <li>• BOTH SX pumps - RUNNING.</li> </ul> </li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if Main Steamlines Should Be Isolated: <ul style="list-style-type: none"> <li>• S/G pressures &gt; 640 psig at 1PM04J.</li> <li>• CNMT pressure &lt; 8.2 psig at 1PM06J.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if CS is required: <ul style="list-style-type: none"> <li>• CNMT pressure remained &lt; 20 psig.</li> </ul> </li> </ul>
	ATC  [CT-18] [CT-18]	<ul style="list-style-type: none"> <li>• Verify total AF flow: <ul style="list-style-type: none"> <li>• AF flow &gt; 500 gpm.</li> </ul> </li> <li><b>Identify the 1B SG as the ruptured SG and isolate prior to a transition to 1BwCA-3.1 is required. (Westinghouse – CT-18) (K/A number - EPE038EA1.32 importance 4.6/4.7)</b> <ul style="list-style-type: none"> <li>• If 1B SG NR level &gt; 10% and rising in an uncontrolled manner, then: <ul style="list-style-type: none"> <li>• <b>CLOSE 1AF013B.</b></li> <li>• <b>CLOSE 1AF013F.</b></li> <li>• Set 1AF005B and 1AF005F pot demand = 0%.</li> </ul> </li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS valve alignment: <ul style="list-style-type: none"> <li>• Group 2 cold leg injection monitor lights lit.</li> </ul> </li> <li>• Verify ECCS flow: <ul style="list-style-type: none"> <li>• High head SI flow &gt;100 gpm (1FI-917).</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check PZR PORVs and spray valves: <ul style="list-style-type: none"> <li>• PORVs CLOSED.</li> <li>• PORV isolation valves – BOTH ENERGIZED.</li> <li>• PORV relief paths – PORVs in AUTO, PORV isolation valves OPEN.</li> <li>• Normal spray valves CLOSED (valve position lights de-energized).</li> </ul> </li> </ul>

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Scenario No:	<b>NRC 1</b>	Event No:	8 & 9
Event Description:		1B SGTR, Loss of Offsite Power	
Time	Position	Applicant's Actions or Behavior	
	ATC	<ul style="list-style-type: none"> <li>Check RCS temperatures: <ul style="list-style-type: none"> <li>RCPs – NONE running. <ul style="list-style-type: none"> <li>Tcold at or trending to 557°F. <ul style="list-style-type: none"> <li>Throttle AF to control cooldown.</li> </ul> </li> </ul> </li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Verify RCPs running (ALL RCPs de-energized).</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check if SG secondary boundaries are intact: <ul style="list-style-type: none"> <li>Verify NO SG depressurizing in an uncontrolled manner or completely depressurized.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check if SG tubes are intact: <ul style="list-style-type: none"> <li>1PR27J and 1B MS line indicate ABNORMAL rads.</li> </ul> </li> </ul>	
	CREW	Identify entry conditions for 1BwEP-3 "STEAM GENERATOR TUBE RUPTURE."	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Request STA evaluation of status trees.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>Enter/implement 1BwEP-3 "STEAM GENERATOR TUBE RUPTURE", and direct operator actions of 1BwEP-3 to establish the following conditions:</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Check status of RCPs: <ul style="list-style-type: none"> <li>RCPs – none running.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Identify ruptured SG 1B. <ul style="list-style-type: none"> <li>1B Main steam line rad monitor ABNORMAL for plant conditions.</li> <li>1B SG level rising uncontrollably.</li> </ul> </li> <li>Isolate ruptured SG. <ul style="list-style-type: none"> <li>Verify 1MS018B CLOSED.</li> <li>Verify 1SD002E &amp; F CLOSED.</li> </ul> </li> </ul> <p><b>Identify the 1B SG as the ruptured SG and isolate prior to a transition to 1BwCA-3.1 is required. (Westinghouse – CT-18) (K/A number - EPE038EA1.32 importance 4.6/4.7)</b></p>	
	[CT-18]	<ul style="list-style-type: none"> <li><b>CLOSE MSIV</b> and MSIV bypass valve <b>for 1B SG</b>.</li> </ul>	
	[CT-18]	<ul style="list-style-type: none"> <li>Check ruptured SG level - Narrow Range &gt; 10%.</li> <li><b>CLOSE 1AF013B&amp;F</b> - may have already been closed in 1BwEP-0.</li> <li>Set 1AF005B and 1AF005F pot demand = 0% - may have already been performed in 1BwEP-0.</li> </ul>	

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Scenario <b>NRC 1</b>		Event 8 & 9
No:		No.
Event Description: 1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>Check ruptured SG pressure &gt; 320 psig.</li> </ul>
	US	<ul style="list-style-type: none"> <li>Specify RCS temperature to which the RCS must be cooled down to allow depressurization of the RCS to ruptured SG pressure.</li> </ul>
	BOP ATC US	<ul style="list-style-type: none"> <li>Dump steam at maximum rate via: <ul style="list-style-type: none"> <li>Intact SG PORVs.</li> </ul> </li> <li>Block MS Isolation after P-11 reached.</li> <li>Dispatch EO with keys to 1SI101A/B.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Check intact SG levels. <ul style="list-style-type: none"> <li>Control Aux feed flow to maintain intact SG levels between 30% and 50%.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>Check PZR PORVs and ISOL Valves: <ul style="list-style-type: none"> <li>PORV isolation valves – Both ENERGIZED.</li> <li>PORVs CLOSED.</li> <li>PORV isolation valves OPEN.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Reset SI <ul style="list-style-type: none"> <li>Depress BOTH SI Reset Pushbuttons at 1PM06J.</li> <li>Verify SI ACTUATED PERMISSIVE light NOT lit at 1PM05J (no power).</li> <li>Verify AUTO SI BLOCKED PERMISSIVE light lit at 1PM05J (no power).</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Reset Phase A. <ul style="list-style-type: none"> <li>Depress BOTH Phase A Reset Pushbuttons at 1PM06J.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Restore IA to Cnmt. <ul style="list-style-type: none"> <li>Check a station air compressor is running at 0PM01J.</li> <li>OPEN 1IA065 and 1IA066 at 1PM11J.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Check if RH pumps should be stopped. <ul style="list-style-type: none"> <li>Check RCS pressure &gt; 325 psig.</li> <li>Stop BOTH RH pumps and place in standby.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Check if RCS cooldown should be stopped: <ul style="list-style-type: none"> <li>Check CETCs &lt; required temperature.</li> <li>Reduce steam flow from intact SG PORVs.</li> <li>Maintain CETCs &lt; required temperature.</li> </ul> </li> <li>Check ruptured SG pressure stable or rising.</li> <li>Check RCS subcooling acceptable.</li> </ul>

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Scenario <b>NRC 1</b>		Event No. 8 & 9
Event Description: 1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior
	ATC  [CT-20]  [CT-20]	<ul style="list-style-type: none"> <li>Depressurize RCS to refill PZR (normal PZR spray NOT available). <b>Depressurize RCS to restore RCS inventory prior to 1B SG PORV or safety valve water release. (Westinghouse – CT-20) (K/A number - EPE038EA1.04 importance 4.3/4.1)</b></li> <li><b>OPEN 1 PZR PORV at 1PM05J until any of the following are met:</b> <ul style="list-style-type: none"> <li>RCS press &lt; ruptured SG press and PZR level &gt; 14%.</li> <li>PZR level &gt; 68%.</li> <li>RCS subcooling is unacceptable.</li> </ul> </li> <li><b>CLOSE 1 PZR PORV at 1PM05J.</b></li> <li>Check RCS pressure rising.</li> </ul>
	ATC  BOP ATC	<ul style="list-style-type: none"> <li>Check if ECCS flow should be terminated. <ul style="list-style-type: none"> <li>Check subcooling acceptable.</li> <li>Check Aux feed flow &gt;500 gpm OR NR level in <math>\geq 1</math> intact SG &gt;10% level.</li> <li>Check RCS pressure stable or rising.</li> <li>Check PZR level &gt;14%.</li> </ul> </li> <li>Stop ECCS pumps. <ul style="list-style-type: none"> <li>Stop both SI pumps</li> <li>Stop 1 CV pump (place control switch to PULL OUT).</li> </ul> </li> </ul>
	BOP ATC	<ul style="list-style-type: none"> <li>Terminate high-head ECCS &amp; establish charging flow. <ul style="list-style-type: none"> <li>Depress BOTH SI recirc sump reset pushbuttons at 1PM06J.</li> <li>Depress BOTH CV pump recirc valve reset pushbuttons at 1PM05J.</li> </ul> </li> <li>Verify CV pump recirc valves OPEN at 1PM05J: <ul style="list-style-type: none"> <li>1CV8110, 1CV8111, 1CV8114 &amp; 1CV8116.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>CLOSE 1SI8801A &amp; B at 1PM05J.</li> <li>Place 1CV182 controller demand at 0%.</li> <li>OPEN 1CV8105 &amp; 1CV8106 at 1PM05J.</li> <li>Adjust 1CV121 and 1CV182 to maintain desired charging and seal injection flow.</li> </ul>
		<p><b>EXAMINER'S NOTE: (1) All critical tasks are complete at this point; the scenario may be terminated at Lead Examiner's discretion.</b></p> <p><b>(2) The following steps address the second RCS depressurization.</b></p>

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Scenario No:	NRC 1	Event No:	8 & 9
Event Description:	1B SGTR, Loss of Offsite Power		
Time	Position	Applicant's Actions or Behavior	
	ATC  BOP ATC	<ul style="list-style-type: none"> <li>Control charging to maintain PZR Level stable.</li> <li>Verify ECCS flow not required: <ul style="list-style-type: none"> <li>Subcooling acceptable.</li> <li>PZR level &gt; 14%.</li> </ul> </li> <li>Check RMCS: <ul style="list-style-type: none"> <li>Makeup set for automatic control (no power).</li> </ul> </li> <li>Check if letdown can be established: <ul style="list-style-type: none"> <li>PZR level &gt; 27%.</li> <li>BOP establishes letdown per 1BwOA ESP-2.</li> <li>Adjust charging and letdown to maintain subcooling and avoid SG overflow.</li> </ul> </li> </ul>	
	ATC	Align Cent Chg pump suction to VCT: <ul style="list-style-type: none"> <li>Check VCT level &gt; 37%.</li> <li>Check VCT pressure 15-65 psig.</li> <li>Open 1CV112B and 1CV112C.</li> <li>Close 1CV112D and 1CV112E.</li> <li>Check 1CV8804A – closed.</li> <li>Check SI and cent chg pumps suction header crosstie valves: <ul style="list-style-type: none"> <li>1SI8807A and B – closed; or</li> <li>1SI8924 – closed</li> </ul> </li> <li>Check if SI Accumulators should be isolated: <ul style="list-style-type: none"> <li>RCS pressure &lt; 800 psig – NO - continue with step 29.</li> </ul> </li> <li>Control RCS pressure and charging flow to minimize RCS to Secondary Leakage: <ul style="list-style-type: none"> <li>PZR level &lt; 27% and 1B SG level rising: raise charging flow and depressurize RCS using a PZR PORV.</li> <li>PZR level 27-50% and 1B SG level rising: depressurize RCS using a PZR PORV.</li> <li>PZR level 50-68% and 1B SG level rising: depressurize RCS using a PZR PORV and reduce charging flow.</li> <li>PZR level &gt;68% and 1B SG level rising: reduce charging flow.</li> </ul> </li> </ul>	
		<b>EXAMINER'S NOTE: Terminate the scenario at Lead Examiner's discretion.</b>	

(Final)

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Simulation Facility	Braidwood	Scenario No.:	Operating Test No.:	<b>15-1 NRC</b>
Examiners:	_____	<b>NRC 2</b>	Applicant:	_____ SRO
	_____			_____ RO
	_____			_____ BOP
Initial Conditions: IC-31				
Turnover: Unit 1 is operating at 90% power, steady state, equilibrium xenon, BOL. Online risk is green. Following completion of turnover, coordinate with Unit 2 and lower total station reactive load by a total of 2 KV in accordance with BwOP MP-23. The 1B HD pump was taken out of service 3 days ago and will NOT be returned to service for an additional 5 days.				

Event No.	Malf. No.	Event Type*	Event Description
Preload	IMF MS01A 100 IMF MS01B 100 IMF MS01C 100 IMF MS01D 100 IMF CS01A IRF RP63 OUT		1A MSIV failed open 1B MSIV failed open 1C MSIV failed open 1D MSIV failed open 1A CS pump fails to start K643 1B CS slave relay fails to actuate
1	None	N-BOP, US	Lower reactive load 1 KV.
2	IMF RX10A 0 15	I-ATC, US TS-US	Turbine impulse pressure channel, 1PT-505, fails low
3	IMF CV10 0 30	I-ATC, US	1CV121 controller failure low
4	IMF RX06K 0 15	I-BOP, US TS-US	1C SG NR level transmitter, 1LT-539, fails low
5	IMF FW35A	C-BOP, US	1A Heater Drain Pump trip
6	None	R-ATC, US	Turbine runback (only 1 HD pump running)
7	IMF MS07C 4	M-ALL	Uncontrolled depressurization of all SGs
8	Preload	C-ALL	Failure of both CS trains to start automatically

\*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient



## **SCENARIO OVERVIEW**

Unit 1 is operating at 90% power, steady state, equilibrium xenon, BOL. Online risk is green. Following completion of turnover, coordinate with Unit 2 and lower total station reactive load by a total of 2 KV in accordance with BwOP MP-23. The 1B HD pump was taken out of service 3 days ago and will NOT be returned to service for an additional 5 days.

**After completing shift turnover and relief**, the BOP will lower Unit 1 reactive load 1 KV in accordance with BwOP MP-23.

**After lowering reactive load**, First Stage Turbine Impulse Pressure channel, 1PT-505, will fail low. After the crew diagnoses the failure of 1PT-505, the ATC will take manual control of rods after verifying turbine load stable. Initial ATC response is per hard card 1BwPR 1-10-RD, followed by entry into 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL, ATTACHMENT D." Tech Spec 3.3.1 Conditions A and P will be entered. The ATC will return rod control to automatic after verifying Tave and Tref are stable and within 1°F.

**After the 1PT-505 failure is addressed**, 1CV121, Charging Pump Flow Control Valve Controller 1FK-121, will fail to 0% demand. The 1CV121 valve will fully close and pressurizer level will drop. The crew will take actions to stabilize the plant by taking manual control of the 1FK-121 controller and restore charging flow.

**After the 1FK-121 failure has been addressed**, 1C SG NR level transmitter, 1LT-539, will fail low. 1FW530, Feedwater Regulating Valve, will open and 1C SG level will rise. The BOP will take manual control of 1C SG level per hard card 1BwPR 1-15-SG and stabilize 1C SG level. 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL," ATTACHMENT E, will be entered. The BOP will restore 1C SG level control to automatic after 1C SG level is restored to normal and an operable 1C SG NR level controlling channel is selected. Tech Specs 3.3.1 Conditions A and E and 3.3.2 Conditions A and D are applicable.

**After the 1LT-539 failure has been addressed**, 1A Heater Drain Pump will trip. 1BwOA SEC-1 "SECONDARY PUMP TRIP," ATTACHMENT C, will be entered. The BOP will initiate a turbine load reduction to 780 MW at 20 MW/minute. The ATC will borate the RCS as necessary during the load reduction.

**As the crew is reducing load to address the 1A HD pump trip**, a large steam break will occur on the 1C MS line. When containment pressure reaches 20 psig, Phase B actuates but the CS pumps do not start. The crew should manually realign train B CS valves which will start the 1B CS pump. Operators should transition to 1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION" and recognize that the MSIVs have failed to close and that an uncontrolled depressurization of all SGs is in progress. The crew will transition to 1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS" where they will throttle AF flow to the SGs. Entry into 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" will be required when the crew throttles AF flow to 45 gpm per SG; however, a note in 1BwFR-H.1 directs that the procedure should NOT be performed. The crew will continue in 1BwCA-2.1.

**Completion criteria** is stopping the RH pumps in 1BwCA-2.1.

### **Critical Tasks**

1. Manually actuate one train of containment spray prior to transition out of 1BwEP-0.  
(Westinghouse – CT-3) (K/A number - 013000A4.01 importance - 4.5/4.8)
2. Manually control AF flowrate to 45 gpm for each SG before orange path in integrity occurs.  
(Westinghouse – CT-33) (K/A number - EPEE12EA1.3 importance – 3.4/3.9)

## SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-31, 90% power, steady state, equilibrium xenon, BOL.
- Verify/place OA & OC VA plenums in service, 0B VA plenum in standby.
- Ensure main generator VARS approx. 230 MVARs out.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN and allow simulator to run during board walk down and turnover.
- Run **caep 151 NRC 2 SETUP** from disk and verify the following actuate:
  - **IMF MS01A 100**
  - **IMF MS01B 100**
  - **IMF MS01C 100**
  - **IMF MS01D 100**
  - **IMF CS01A**
  - **IRF RP63 OUT**
- Verify SER and RM-11 printers are clear of data.
- Place the 1B HD pump C/S in PULL OUT and place the 1B HD pump OOS.
- Provide students with turnover sheets, and a copy of BwOP MP-23.

**Event 1: Lower total station reactive load 2 KV.**

Acknowledge as Shift Manager the start and completion of procedure.

Acknowledge as Unit 2, the need to lower Unit 2 reactive load by 1 KV (50 MVARs).

If asked, eGPM website is down.

If asked, lowering reactive load has been logged per BwOP MP-23.

**If contacted, acknowledge as a generation dispatcher (Kerry Koch) completion of reactive load adjustment.**

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**Event 2: Turbine Impulse Pressure channel 1PT-505 failed low.**

Insert **IMF RX10A 0 15** to fail 1PT-505 low over 15 seconds.

As SM, acknowledge the failure, 1BWOA INST-2 entry, request for E Plan evaluation, LCO 3.3.1 Conditions A & P entry, and requests for on-line risk assessment, maintenance support, and IR initiation.

As SM, if requested support for tripping bistable in AEER, report that AEER bistable is not to be tripped until work analyst and NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued.

As an extra NSO, if asked, report/perform the following concerning AMS:

- Initially: Operating Bypass switch (SW12) is in OFF.
  - Operating Bypass switch (SW12) to TIP 1: perform the following:
    - **IMF PN0470 ON** to turn on annunciator 1-18-E11.
  - Operating Bypass Test Input (SW11) to TEST-TRIP: perform the following:
    - **IRF RX149 TRIP** to trip AMS C-20 for 1PT-505.
- 

**Event 3: 1FK121 Controller failure.**

Insert **IMF CV10 0 30** to fail 1CV121 closed over 30 seconds.

If dispatched as EO to investigate, wait two minutes and report no visible damage to 1CV121 valve. 1CV121 appears to be failed closed and responding correctly in manual (if asked for feedback to manual operations).

Acknowledge as Shift Manager the failure, request for maintenance support, and IR request.

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**Event 4: 1C SG NR level transmitter 1LT-539 fails low.**

Insert **IMF RX06K 0 15** to fail 1LT-539 low over a 15 second period.

Acknowledge as Shift Manager the failure, 1BwOA INST-2 entry, LCOAR entry, on-line risk assessment, EAL evaluation, request for maintenance support, and IR request.

Acknowledge as Shift Manager on line risk assessment, request for IR, evaluation for reactivity screening, QNE and personnel notifications, and evaluation of return to full power operation.

If lead examiner desires the bistable bypassed, participate in brief and perform the following:

To bypass the required bistables, participate in brief and perform the following (SDG RX19):

- As extra NSO contact Unit 1 (X2209).
- Insert the following:
  - **MRF RP20 OPEN** (open protection cabinet #1 door).
  - **IRF RX063A BYPASS** (Bypass LB 539A).
  - **IRF RX063B BYPASS** (Bypass LB 539B).
  - **MRF RP20 CLOSE** (close protection cabinet #1 door).

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**Event 5: 1A Heater Drain Pump trip.**

Insert **IMF FW35A**

As SM, acknowledge the failure, 1BwOA SEC-1 entry, request for E Plan evaluation, and requests for on line risk assessment, maintenance support, and IR initiation.

If dispatched as EO, wait 2 minutes, then report 1A Heater Drain pump has a ground overcurrent flag at breaker cubicle. If asked, the 1A HD pump has no issues locally.

If dispatched to the 1B HD pump breaker, wait 2 minutes, then report that the breaker appears to be damaged. The breaker is not fully in the cubicle and the frame appears bent. If asked, the 1B HD pump has no issues locally.

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**Event 6: Turbine runback (only 1 HD pump running).**

As SM acknowledge the turbine runback.

Acknowledge as Generation Dispatch, the initiation of ramp.

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**Event 7/8: Uncontrolled depressurization of ALL SGs; Auto SI and CS failures.**

Insert **IMF MS07C 4** to initiate a 4 Mlb/hr steam break on the 1C SG.

Acknowledge as SM procedure changes, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status: Red Path on heat sink when AF throttled to 45 gpm per SG, orange on integrity if RCS cold leg temperature < 240°F.

If dispatched as EO to investigate 1A CS pump, wait 3 minutes, then report ground overcurrent flag at breaker cubicle.

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Scenario No: <b>NRC 2</b>		Event No: <b>1</b>
Event Description: Lower reactive load 1 KV on Unit 1 (U-2 will also lower 1 KV)		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>From turnover, lower total station reactive load 2 KV in accordance with BwOP MP-23 "ADJUSTING REACTIVE LOAD."</li> </ul>
	US	Direct BOP to perform BwOP MP-23.
		<p><b>EXAMINER'S NOTE: (1) The limitation and action associated with BwOP MP-23 of logging the reactive load change has been logged.</b></p> <p><b>(2) Adjusting the reactive load 1 KV correlates to 50 MVARs on 1VI-MP006.</b></p>
	BOP	<ul style="list-style-type: none"> <li>Refer to BwOP MP-23.</li> <li>Verify MVAR change will not exceed Generator Capability Curve in 1BwGP 100-3A6.</li> <li>Monitor PPC point Q2801 (preferred), 1VI-MP006, main generator output VARS, and switchyard bus voltage during the MVARs adjustment.</li> <li>Perform the following at 1PM01J: <ul style="list-style-type: none"> <li>Contact Unit 2 and coordinate lowering total station reactive load by 2 KV.</li> <li>Place volt adjust C/S to lower (may be done intermittently).</li> <li>Release volt adjust C/S when Q2801 has dropped 50 MVARs (1 KV).</li> </ul> </li> <li>Inform US BwOP MP-23 is complete.</li> </ul>
	US	<ul style="list-style-type: none"> <li>Acknowledge report. <ul style="list-style-type: none"> <li>Notify SM that BwOP MP-23 is complete.</li> <li>Notify Generation Dispatch that BwOP MP-23 is complete.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>Peer check actions of BOP.</li> <li>Monitor remainder of MCBs.</li> </ul>
		<p><b>EXAMINER'S NOTE: After BwOP MP-23 is complete and with Lead Examiner's concurrence, enter next event.</b></p>

Comments: \_\_\_\_\_

Scenario No:	<b>NRC 2</b>	Event No:	2
Event Description:	Turbine Impulse Pressure Channel, 1PT-505, failed low		
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>• Annunciator TAVE CONT DEV HIGH (1-14-D1)</li> <li>• 1PI-505, First Stage Pressure, lowering.</li> <li>• Control rod inward motion.</li> <li>• 1TR-0412, Auct Tave/Tref recorder, Tref indication lowering.</li> <li>• 1SI-412, Rod Speed, indicates 72 step per minute.</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Recognize 1PT-505 has failed low.</li> <li>• Report failure to US.</li> <li>• Review hard card 1BwPR 1-10-RD and take the following actions: <ul style="list-style-type: none"> <li>• Check turbine load stable.</li> <li>• Place rod control in manual.</li> <li>• Check rods NOT moving.</li> </ul> </li> <li>○ Refer to BwARs as time permits.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Verifies turbine load stable.</li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL."</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM to evaluate Emergency Plan conditions.</li> <li>• Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL," ATTACHMENT D "TURBINE IMPULSE PRESSURE CHANNEL FAILURE" and direct operator actions of 1BwOA INST-2 to establish the following conditions:</li> <li>• Direct ATC to place rod control in manual (previously performed).</li> <li>○ If PZR pressure drops below 2209 psig, enter Tech Spec 3.4.1 Condition A until pressure is &gt; 2209 psig.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Restore steam dumps: <ul style="list-style-type: none"> <li>• Check C-7 NOT lit.</li> <li>• Place 1PK-507 in manual.</li> <li>• Lower 1PK-507 demand to 0%.</li> <li>• Place steam dump mode select switch to STM PRESS mode.</li> <li>• Place 1PK-507 in auto.</li> </ul> </li> <li>• Check Reactor Power &lt;100%.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Place Turbine Impulse Pressure Defeat Switch, 1PS505Z, to DEFEAT P-505.</li> </ul>	

Comments: \_\_\_\_\_

Scenario No: <b>NRC 2</b>		Event No: <b>2</b>
Event Description: <b>Turbine Impulse Pressure Channel, 1PT-505, failed low</b>		
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• Check if rod control can be placed in auto: <ul style="list-style-type: none"> <li>• C5 NOT lit.</li> <li>• Tave/Tref stable and within 1°F (check T0494 or 1TR-0412).</li> <li>○ If control rods need to be adjusted to restore Tave – Tref within 1°F, perform the following: <ul style="list-style-type: none"> <li>○ Obtain SM concurrence for reactivity change.</li> <li>○ Adjust Tave – Tref within 1°F using control rods, or</li> <li>○ Adjust Tave – Tref within 1°F by dilution/load drop.</li> </ul> </li> </ul> </li> <li>• Place rod control in auto.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check P13 interlock: <ul style="list-style-type: none"> <li>• Turbine power &gt; 10% - P13 NOT lit.</li> <li>○ Trip bistables (bistables will NOT be tripped at this time).</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Check status of AMS: <ul style="list-style-type: none"> <li>• Operating Bypass switch (SW12) at 1PA54J – OFF.</li> <li>• Locally trip AMS bistable at 1PA54J – C-20.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Determine Tech Spec 3.3.1 Conditions A and P are applicable.</li> <li>• Contact SM to perform risk assessment, initiate IR, perform reactivity screening, notify QNE and contact personnel to investigate/correct instrument failure.</li> </ul>
		<b>EXAMINER'S NOTE: After the above actions by the US and with Lead Examiner's concurrence, insert next event.</b>

Comments: \_\_\_\_\_

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Scenario <b>NRC 2</b>		Event <b>3</b>
No:		No.
Event Description: <b>1CV121 controller fails low in auto</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator CHG LINE FLOW HIGH LOW (1-9-D3)</li> <li>• Annunciator REGEN HX LTDWN TEMP HIGH (1-9-A1)</li> <li>• Annunciator RCP SEAL WTR INJ FLOW LOW (1-7-B2)</li> <li>• 1FK-121 controller output failed low.</li> <li>• Charging flow, 1FI-121A, lowering.</li> <li>• PZR level, 1LI-459A/460A/461, lowering.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Perform the following at 1PM05J: <ul style="list-style-type: none"> <li>• Determine loss of charging flow.</li> <li>• Identify 1FK-121 is failing low.</li> <li>• Report failure to US.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Perform the following at 1PM05J: <ul style="list-style-type: none"> <li>• Place 1FK-121, 1CV121 Controller, in manual.</li> <li>• Raise demand on 1FK-121.</li> <li>• Monitor charging flow and pressurizer level and return level to normal.</li> <li>• Maintain charging flow by operating 1FK-121 in manual.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>○ Reference BwARs as time permits.</li> <li>○ If required, isolate letdown per BwAR or use hard card 1BwPR 1-9-LD: <ul style="list-style-type: none"> <li>○ Close 1CV8149A-C.</li> <li>○ Close 1CV459/460.</li> <li>○ Adjust 1CV121 and 1CV182, as required.</li> <li>○ Close 1CV8105/1CV8106.</li> </ul> </li> <li>• Recognize 1FK-121 output failed low.</li> <li>○ Dispatch operator to investigate cause of failure.</li> </ul>
		<b>EXAMINER'S NOTE: THE CREW MAY ELECT TO ENTER 1BwOA PRI-15 "LOSS OF NORMAL CHARGING." SEE NEXT PAGE FOR ACTIONS OF 1BwOA PRI-15.</b>
	US	<ul style="list-style-type: none"> <li>○ Direct actions of 1BwOA PRI-15 (see note above).</li> <li>• Direct/ensure ATC takes manual control of 1FK-121 and returns charging flow to normal.</li> <li>○ Inform SM of FK-121 failure.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> </ul>
	US	<ul style="list-style-type: none"> <li>○ IF PZR pressure drops below 2209 psig, enter Tech Spec 3.4.1 Condition A.</li> </ul>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event <b>3</b>
No:		No.
Event Description: <b>1CV121 controller fails low in auto</b>		
Time	Position	Applicant's Actions or Behavior
	ATC	<p><b><u>1BwOA PRI-15 ACTIONS (APPLICABLE IF CREW ENTERS THE PROCEDURE):</u></b></p> <ul style="list-style-type: none"> <li>○ Status of Cent Chg Pumps (one running).</li> <li>○ Check Cent Chg pump parameters (none fluctuating).</li> <li>○ If 1PI-120A less than RCS pressure: <ul style="list-style-type: none"> <li>○ Place 1CV121 in manual (at this point, the ATC is likely to determine the controller was failed in automatic).</li> <li>○ Place affected Cent Chg pump in Pull Out.</li> <li>○ Start the standby Cent Chg pump.</li> <li>○ Place 1CV121 in auto if desired (crew should keep the controller in manual).</li> </ul> </li> <li>○ Check CV System Alignment: <ul style="list-style-type: none"> <li>○ Either 1CV8146 or 1CV8147 Open (one open).</li> <li>○ 1CV8324A or 1CV8324B Open (one open).</li> <li>○ BOTH 1CV8105 and 1CV8106 Open (if previously closed, crew re-opens valves).</li> </ul> </li> <li>○ Check charging flow established (established).</li> <li>○ Check normal letdown isolated (if previously isolated, crew implements 1BwOA ESP-2 to re-establish normal letdown).</li> <li>○ Notify SM to perform risk evaluation, initiate IR and make external notifications.</li> <li>○ Evaluate Tech Specs/TRM (none applicable).</li> <li>○ Return to procedure and step in effect.</li> </ul>
	BOP	
	BOP	<p><b><u>1BwOA ESP-2 ACTIONS (APPLICABLE IF CREW ISOLATED LETDOWN) in 1BwOA PRI-15:</u></b></p> <ul style="list-style-type: none"> <li>○ Restore normal letdown using 1BwOA ESP-2 "REESTABLISHING LETDOWN DURING ABNORMAL CONDITIONS" as directed by performing the following at 1PM05J: <ul style="list-style-type: none"> <li>○ Close letdown orifice isolation valves (1CV8149A-C).</li> <li>○ Close letdown line isolation valves (1CV459 and 1CV460).</li> <li>○ Verify either 1CV8401A or B open.</li> <li>○ Open 1CV8324A and 1CV8389A.</li> <li>○ Letdown CNMT isolation valves 1CV8152 and 1CV8160 open.</li> <li>○ BTRS Mode Selector switch OFF light LIT.</li> <li>○ Place 1CV131 controller in manual at 40% demand.</li> <li>○ Place 1CC130 controller in manual at 60% demand.</li> <li>○ 1CV8105/1CV8106 open.</li> <li>○ Adjust 1CV121 and 1CV182 to establish at least 100 gpm charging with seal injection 8-13 gpm per RCP.</li> <li>○ Open 1CV459 and 1CV460.</li> <li>○ Re-establish 120 gpm letdown flow by opening appropriate orifice isolation valves (1CV8149A and either 1CV8149B or C).</li> <li>○ Adjust 1CV131 and 1CC130 to restore letdown to 360 psig and 90-115°F.</li> <li>○ Place controllers in auto when desired (1CV131 and 1CC130).</li> <li>○ Verify 1PR06J restored (RM-11).</li> </ul> </li> <li>○ Return to procedure and step in effect.</li> </ul>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event <b>3</b>
No:		No.
Event Description: <b>1CV121 controller fails low in auto</b>		
Time	Position	Applicant's Actions or Behavior
	BOP	<p><b><u>1BwOP CV-17 ACTIONS (APPLICABLE IF CREW ISOLATED LETDOWN):</u></b></p> <ul style="list-style-type: none"> <li>○ Perform the following at 1PM05J to establish normal letdown flow through the 1A letdown heat exchanger in accordance with BwOP CV-17 "ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW" (N/A if excess letdown established): <ul style="list-style-type: none"> <li>● Verify/close 1CV8149A, B, &amp; C, letdown orifice isolation valves.</li> <li>○ Contact operators to locally verify CC locally aligned to 1A letdown HX.</li> <li>● Place 1PK-131, letdown line pressure controller, in manual and raise demand to 40%.</li> <li>● Place 1CC-130A, letdown HX outlet temperature controller, in manual and raise demand to 60%.</li> <li>● Open 1CV8152 &amp; 1CV8160, letdown line CNMT isolation valves.</li> <li>● Open 1CV459 &amp; 1CV460, letdown line isolation valves.</li> <li>● Open 1CV8324A, charging to regen HX 1A isolation valve.</li> <li>● Open 1CV8389A, letdown to regen HX 1A isolation valve.</li> <li>● Verify OFF light is lit above BTRS mode selector C/S (signifies that 1CV381B is OPEN &amp; 1CV381A is CLOSED.</li> <li>● Verify/open 1CV8401A, letdown HX 1A inlet valve.</li> <li>● Verify/closed 1CV8145, PZR aux spray valve.</li> <li>● Verify/open 1CV8147, charging to loop 1A isolation valve.</li> <li>● Open 1CV8105 &amp; 1CV8106, charging line CNMT isolation valves.</li> <li>● Control 1FK-121, CV pumps flow control valve, in manual to raise letdown flow to 100 gpm while concurrently adjusting 1CV182, charging header backpressure control valve, to control RCP seal injection 8-13 gpm per RCP.</li> <li>● Open 1CV8149A/B/C, letdown orifice isolation valves, as necessary to establish desired letdown flow while concurrently and controlling 1PK-131, letdown line pressure controller, in manual to maintain letdown pressure 360-380 psig.</li> <li>● Control 1CC130A, letdown HX outlet temperature controller, in manual to maintain letdown temperature 90-115°F.</li> <li>● Place 1FK-121, 1PK-131 &amp; 1CC130A in auto.</li> <li>● Verify 1PR06J in service at the RM-11 console.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: After the crew restores charging flow and with Lead Examiner's concurrence, insert next event.</b>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event No. 4
Event Description: 1C SG NR level transmitter, 1LT-539, fails low		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator S/G 1C LEVEL DEVIATION HIGH LOW (1-15-C9)</li> <li>• Annunciator S/G 1C LVL LO-2 RX TRIP ALERT (1-15-C5)</li> <li>• SG 1C feed flow and NR level rising.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Determine SG 1C feed flow and/or NR level rising at 1PM04J.</li> <li>• Identify 1LI-539 indicates lowering SG NR level at 1PM04J.</li> <li>• Review hard card 1BwPR 1-15-SG and performs the following actions: <ul style="list-style-type: none"> <li>• Place 1C FRV controller in manual.</li> <li>• Restore 1C SG level to pre-failed value.</li> <li>• Determine failed input channel.</li> <li>• Verify/select operable channel (L-558).</li> </ul> </li> <li>○ Refer to BwARs as time permits.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify Shift Manager of SG level channel failure.</li> <li>• Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL," ATTACHMENT E "NARROW RANGE SG LEVEL CHANNEL FAILURE," and direct operator actions of 1BwOA INST-2 to establish the following conditions:</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Stabilize 1C SG level at 1PM04J (actions performed previously). <ul style="list-style-type: none"> <li>○ Place 1FK-530, FW Reg Valve 1FW530 controller, in manual.</li> <li>○ Lower demand on 1FK-530 sufficiently to lower FW flow to restore 1C SG level.</li> <li>○ Operate 1FK-530 in manual to stabilize 1C SG level in the normal operating band.</li> <li>○ Select an operable channel (L-558).</li> </ul> </li> <li>• Establish automatic level control by placing 1FK-530 in auto when SG level restored to program level.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Perform the following: <ul style="list-style-type: none"> <li>• Check Rx power &lt; 100% - Monitor reactor power at 1PM05J/PPC.</li> <li>• Assist US by making notifications.</li> <li>○ Refer to BwARs as time permits.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: The following steps will be performed if the Lead Examiner desires to observe bypassing bistables.</b>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event No. <b>4</b>
Event Description: <b>1C SG NR level transmitter, 1LT-539, fails low</b>		
Time	Position	Applicant's Actions or Behavior
	US	<ul style="list-style-type: none"> <li>○ Perform pre-job brief per HU-AA-1211 for bistable bypassing.</li> <li>○ Complete 1BwOL 3.3.1/3.3.2, Attachment A, INSTRUMENT CONDITION TRACKING LOG.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>○ Locally bypass bistables for 1C SG level channel 1LT-539 by placing in BYPASS/ BOP verifies correct bistable operation: <ul style="list-style-type: none"> <li>○ P-14/LO-2 Rx Trip/AF Pump Start.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>● Determine AMS channel NOT affected.</li> <li>● Determine Tech Spec 3.3.1 Conditions A and E are applicable.</li> <li>● Determine Tech Spec 3.3.2 Conditions A and D are applicable.</li> <li>● Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure, and make other notifications.</li> </ul>
		<b>EXAMINER'S NOTE: After the above actions by the US and with Lead Examiner's concurrence, insert next event.</b>

Comments: \_\_\_\_\_

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Scenario No: <b>NRC 2</b>		Event No: 5 & 6
Event Description: 1A Heater Drain Pump Trip		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator HD PUMP TRIP (1-17-D2)</li> <li>• HD Tank level rising.</li> <li>• HD pump discharge valves opening.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Recognize 1A HD pump tripped. <ul style="list-style-type: none"> <li>○ Refer to BwAR 1-17-D2 as time permits.</li> </ul> </li> <li>• Report failure to US.</li> <li>• Recognize only one HD pump running.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA SEC-1 "SECONDARY PUMP TRIP."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Acknowledge 1A HD pump trip.</li> <li>• Implement 1BwOA SEC-1 "SECONDARY PUMP TRIP," ATTACHMENT C "HD PUMP TRIP" and direct operator actions of 1BwOA SEC-1 to establish the following conditions: <ul style="list-style-type: none"> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure.</li> <li>• Notify SM of the HD runback.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Recognize standby HD pump NOT AVAILABLE.</li> <li>• Check HD pump status. <ul style="list-style-type: none"> <li>• ONLY 1C HD pump running.</li> <li>• Initiate turbine load reduction to 780 MW at 20 MW/min. <ul style="list-style-type: none"> <li>• Initiate HD runback on OWS graphic 5512.</li> </ul> </li> <li>• Verify turbine load lowering.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Check HD Tank level: <ul style="list-style-type: none"> <li>• Level &gt; 72% and rising.</li> <li>• Maintain HD tank level: <ul style="list-style-type: none"> <li>○ Verify 1HD046A &amp;B opening in AUTO.</li> <li>○ Open 1CB113A-D.</li> <li>○ Manually open 1HD117, HD tank overflow valve.</li> </ul> </li> </ul> </li> <li>• Check 1HD117, HD tank overflow valve, in auto and closed. <ul style="list-style-type: none"> <li>○ Lower turbine load as necessary to close 1HD117 (load ramp in progress).</li> </ul> </li> <li>• Check 1C HD pump parameters: <ul style="list-style-type: none"> <li>• 1C HD pump amps &lt; 168 amps.</li> <li>• 1C HD pump flow &lt; 2950 KLB/HR.</li> <li>○ Lower turbine load as necessary to restore 1C HD pump parameters.</li> </ul> </li> <li>• Deactivate turbine runback.</li> </ul>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event <b>5 &amp; 6</b>
No:		No.
Event Description: <b>1A Heater Drain Pump Trip</b>		
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• Check PDMS operable: <ul style="list-style-type: none"> <li>• Annunciator PDMS INOPERABLE not lit (1-10-E8).</li> <li>• 1BwOS PDMS-1A not implemented.</li> <li>• Annunciator PDMS LIMIT EXCEEDED not lit (1-10-D7).</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Control <math>\Delta I</math> near target. <ul style="list-style-type: none"> <li>• Operate control rods in manual to restore <math>\Delta I</math> near target.</li> </ul> </li> <li>• Monitor RCS parameters: <ul style="list-style-type: none"> <li>○ If PZR pressure lowers &lt; 2209 psig, notify US to enter Tech Spec 3.4.1, RCS DNB Limits, Condition A.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Initiate RCS boration.</li> <li>• Determine required boric acid volume. <ul style="list-style-type: none"> <li>○ Determine from Op Aid (ramp starts from 90%).</li> </ul> </li> <li><b>Borate in Automatic (BwOP CV-6 hard card):</b> <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters to equalize boron concentration.</li> <li>• Set 1FY-0110 BA Blender Predet Counter to desired value.</li> <li>• Set 1FK-110 BA Flow Control to desired boration rate</li> <li>• Place MAKE-UP MODE CONT SWITCH to STOP position.</li> <li>• Place MODE SELECT SWITCH to BORATE position.</li> <li>• Place MAKE-UP MODE CONT SWITCH to START.</li> <li>• Verify the following occurs: <ul style="list-style-type: none"> <li>• 1CV110B opens.</li> <li>• 1CV110A opens.</li> <li>• BA pump starts.</li> <li>• Proper BA flow on recorder 1FR-110.</li> </ul> </li> <li>• When desired boration is achieved, place MAKE-UP MODE CONT SWITCH to STOP.</li> <li>• Verify the following occurs: <ul style="list-style-type: none"> <li>• 1CV110B closes.</li> <li>• 1CV110A closes.</li> <li>• BA pump stops.</li> </ul> </li> <li>• Record time and amount of BA addition.</li> <li>• Perform BwOP CV-7 to return RMCS to AUTO following the final boration.</li> </ul> </li> </ul> <p>OR</p>

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event <b>5 &amp; 6</b>
No:		No.
Event Description: <b>1A Heater Drain Pump Trip</b>		
Time	Position	Applicant's Actions or Behavior
		<p><b>Batch addition of Boric Acid (BwOP CV-6 hard card):</b></p> <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters to equalize boron concentration.</li> <li>○ Momentarily depress RESET pushbutton on BA Flow totalizer.</li> <li>● Open 1CV110B.</li> <li>● Open 1CV110A.</li> <li>● Start the BA Transfer Pump.</li> <li>○ If desired, control VCL level by adjusting 1LK-112 setpoint to desired value.</li> <li>● When desired amount of BA has been added, stop the BA Transfer Pump.</li> <li>● Close 1CV110A.</li> <li>● Close 1CV110B.</li> <li>● Verify VCT level/pressure at desired value and adjust 1LK-112 setpoint to desired corresponding level setpoint.</li> <li>● Place 1CV110A/1CV110B in AUTO.</li> <li>● Record time and amount of BA addition.</li> <li>● Perform BwOP CV-7 to return RMCS to AUTO following the final boration.</li> <li>○ May flush boric acid lines per BwOP CV-6 step. F.5.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>● Verify running CB pump recirc valves in auto <ul style="list-style-type: none"> <li>● 1CB113A-D on running pumps.</li> </ul> </li> <li>● Dispatch operators to perform BwOP HD-2 for 1A HD pump.</li> <li>● Shutdown 4<sup>th</sup> CD/CB pump (if started during procedure performance).</li> </ul>
	US	<ul style="list-style-type: none"> <li>● Notify Chemistry to monitor secondary plant chemistry.</li> <li>● Notify SM to perform risk assessment.</li> <li>● Check reactor power change &gt; 15% in one hour: <ul style="list-style-type: none"> <li>○ Notify Chemistry to perform Tech Spec 3.4.16 sampling.</li> <li>○ Notify Rad Protection to perform RETS 12.4.1.A sampling.</li> </ul> </li> <li>○ Determine Tech Spec 3.1.6 Condition A entry required if control rods below LO-2 rod insertion limit.</li> <li>○ Determine Tech Spec 3.4.1 Condition A entry if PZR pressure lowers &lt; 2209 psig.</li> </ul>
		<b>EXAMINER'S NOTE: After the above actions are complete by the US and with Lead Examiner's concurrence, insert next event.</b>

Comments: \_\_\_\_\_



Scenario No: <b>NRC 2</b>		Event No: 7, 8
Event Description: Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator CNMT PRESS HIGH SI/RX TRIP (1-11-E1)</li> <li>• All SG pressures dropping.</li> <li>• RCS Tave dropping.</li> <li>• Rx Trip breakers open.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Enter/implement 1BwEP-0 and direct operator actions of 1BwEP-0.</li> </ul>
	ATC	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>• Verify reactor trip:               <ul style="list-style-type: none"> <li>• Rod bottom lights - ALL LIT.</li> <li>• Reactor trip &amp; Bypass breakers – OPEN.</li> <li>• Neutron flux – DROPPING.</li> </ul> </li> </ul>
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM02J: <ul style="list-style-type: none"> <li>• Verify turbine trip:               <ul style="list-style-type: none"> <li>• All Turbine throttle valves – CLOSED.</li> <li>• All Turbine governor valves – CLOSED.</li> </ul> </li> </ul>
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J: <ul style="list-style-type: none"> <li>• Verify power to 4KV busses:               <ul style="list-style-type: none"> <li>• ESF Buses – BOTH ENERGIZED.</li> </ul> </li> </ul>
	ATC	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>• Check SI status:               <ul style="list-style-type: none"> <li>○ SI First OUT annunciator - Annunciator CNMT PRESS HIGH SI/RX TRIP (1-11-E1) LIT.</li> <li>○ SI ACTUATED Permissive Light – LIT.</li> <li>○ SI Equipment – AUTOMATICALLY ACTUATED:                   <ul style="list-style-type: none"> <li>○ Either SI pump – RUNNING.</li> <li>○ Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.</li> </ul> </li> </ul> </li> <li>• Manually actuate SI from 1PM05J and 1PM06J.</li> </ul>
	US	<ul style="list-style-type: none"> <li>▪ Direct BOP to perform Attachment B of 1BwEP-0.</li> </ul>
<b>EXAMINER'S NOTE: US and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.</b>		

Comments: \_\_\_\_\_

Scenario No:	<b>NRC 2</b>	Event No:	7, 8
Event Description:	Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate		
Time	Position	Applicant's Actions or Behavior	
	BOP	<p><b>1BwEP-0 ATTACHMENT B:</b></p> <ul style="list-style-type: none"> <li>▪ Verify FW isolated at 1PM04J: <ul style="list-style-type: none"> <li>• FW pumps – TRIPPED.</li> <li>• FW isolation monitor lights – LIT.</li> <li>• FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.</li> </ul> </li> <li>• Verify DGs running at 1PM01J: <ul style="list-style-type: none"> <li>• DGs – BOTH RUNNING.</li> <li>• 1SX169A/B OPEN.</li> <li>• Dispatch operator to monitor DGs operation.</li> </ul> </li> <li>• Verify Generator Trip at 1PM01J: <ul style="list-style-type: none"> <li>• OCB 1-8 and 7-8 open.</li> <li>• PMG output breaker open.</li> </ul> </li> <li>• Verify Control Room ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.</li> <li>• Operating VC train equipment – RUNNING. <ul style="list-style-type: none"> <li>• 0B Supply fan</li> <li>• 0B Return fan</li> <li>• 0B M/U fan</li> <li>• 0B Chilled water pump</li> <li>• 0B Chiller</li> </ul> </li> <li>• Operating VC train dampers – ALIGNED. <ul style="list-style-type: none"> <li>• M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.</li> <li>• 0B VC train M/U filter light – LIT.</li> <li>• 0VC09Y – OPEN.</li> <li>• 0VC313Y – CLOSED.</li> </ul> </li> <li>• Operating VC train Charcoal Absorber aligned for train B. <ul style="list-style-type: none"> <li>• 0VC44Y – CLOSED.</li> <li>• 0VC05Y – OPEN.</li> <li>• 0VC06Y – OPEN.</li> </ul> </li> <li>• Control Room pressure greater than +0.125 inches water on 0PDI-VC038.</li> </ul> </li> <li>• Verify Auxiliary Building ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• Two inaccessible filter plenums aligned. <ul style="list-style-type: none"> <li>• Plenum A: <ul style="list-style-type: none"> <li>• 0VA03CB – RUNNING.</li> <li>• 0VA023Y – OPEN.</li> <li>• 0VA436Y – CLOSED.</li> </ul> </li> <li>• Plenum C: <ul style="list-style-type: none"> <li>• 0VA03CF RUNNING.</li> <li>• 0VA072Y – OPEN.</li> </ul> </li> </ul> </li> </ul> </li> </ul>	

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event No. 7, 8
Event Description:		Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• 0VA438Y – CLOSED.</li> <li>• Verify FHB ventilation aligned for emergency operation at 0PM02J: <ul style="list-style-type: none"> <li>• 0VA04CB – RUNNING.</li> <li>• 0VA055Y – OPEN.</li> <li>• 0VA062Y – OPEN.</li> <li>• 0VA435Y – CLOSED.</li> </ul> </li> <li>• Trip 1C HD pump.</li> <li>• Initiate periodic monitoring of Spent Fuel Cooling.</li> <li>• Notify US Attachment B complete/manual actions taken.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS pumps running at 1PM05J/1PM06J: <ul style="list-style-type: none"> <li>• BOTH CV pumps – RUNNING.</li> <li>• BOTH RH pumps – RUNNING.</li> <li>• BOTH SI pumps – RUNNING.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Perform the following at 1PM06J: <ul style="list-style-type: none"> <li>• RCFCs running in accident mode. <ul style="list-style-type: none"> <li>• Group 2 RCFC accident mode status light lit.</li> </ul> </li> <li>• CNMT Phase A valves closed.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: RCPs may be stopped by the crew any time after recognizing that Phase B isolation has occurred.</b>
	ATC	<p>Perform the following at 1PM06J:</p> <ul style="list-style-type: none"> <li>• Verify Cnmt Vent isolation: <ul style="list-style-type: none"> <li>• Group 6 Cnmt Vent Isol monitor lights – LIT.</li> </ul> </li> <li>• Verify AF system: <ul style="list-style-type: none"> <li>• BOTH AF pumps – RUNNING.</li> <li>• AF isolation valves – 1AF13A-H OPEN.</li> <li>• AF flow control valves - 1AF005A-D throttled OPEN.</li> </ul> </li> <li>• Verify CC pumps running: <ul style="list-style-type: none"> <li>• BOTH CC pumps – RUNNING.</li> </ul> </li> <li>• Verify SX pumps running: <ul style="list-style-type: none"> <li>• BOTH SX pumps - RUNNING.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if Main Steamlines Should Be Isolated: <ul style="list-style-type: none"> <li>• CNMT pressure &gt; 8.2 psig OR SG pressure &lt;640 psig.</li> </ul> </li> <li>• Verify MS isolation: <ul style="list-style-type: none"> <li>• MSIVs are open.</li> </ul> </li> </ul>

Comments: \_\_\_\_\_

Scenario No: <b>NRC 2</b>		Event No: 7, 8
Event Description: Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• Manually actuate MS isolation. <ul style="list-style-type: none"> <li>• ALL MSIVs remain open.</li> <li>• Place control switches to close for ALL MSIVs (ALL MSIVs remain open).</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>○ Determine and announce containment is adverse when containment pressure rises above 5 psig.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if CS is required <ul style="list-style-type: none"> <li>• CNMT pressure &gt; 20 psig.</li> <li>• Group 6 CS monitor lights – NOT ALL LIT.</li> <li>• Manually actuate CS and Phase B Isolation.</li> <li>• Group 6 CS monitor lights remain – NOT ALL LIT, GO TO Attachment C.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Implement 1BwEP-0, ATTACHMENT C "MANUAL CS ACTUATION."</li> </ul>

Comments: \_\_\_\_\_

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Scenario No:	<b>NRC 2</b>	Event No:	7, 8
Event Description:	Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate		
Time	Position	Applicant's Actions or Behavior	
		<b>1BwEP-0, ATTACHMENT C "MANUAL CS ACTUATION"</b>	
		<b>EXAMINER'S NOTE: The examinees will also attempt to align the "A" train of CS, however only the "B" train will properly align and start the 1B CS pump as outlined below.</b>	
	ATC  [CT-3]  [CT-3] [CT-3]	<ul style="list-style-type: none"> <li>• Check CS valve alignment: <ul style="list-style-type: none"> <li>• Check 1CS001A/B – OPEN.</li> <li>• Check 1CS007A/B – OPEN:</li> </ul> </li> <li><b>Manually actuate one train of containment spray prior to transition out of 1BwEP-0. (Westinghouse – CT-3) (K/A number - 013000A4.01 importance - 4.5/4.8)</b> <ul style="list-style-type: none"> <li>• 1CS007A – OPEN.</li> <li>• <b>Manually open 1CS007B.</b></li> </ul> </li> <li>• Check <b>1CS019A/B – OPEN.</b> <ul style="list-style-type: none"> <li>• 1CS007A open.</li> <li>• <b>Place 1B CS pump test switch in test.</b></li> <li>• <b>Manually open 1CS019B.</b></li> <li>• Place 1B CS pump test switch in normal</li> </ul> </li> <li>• Check 1CS010A/B – OPEN.</li> <li>• Check CS pumps – AT LEAST ONE RUNNING: <ul style="list-style-type: none"> <li>• 1B CS pump running.</li> <li>○ Place 1A CS pump in PTL.</li> </ul> </li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Return to 1BwEP-0 main body, step 14.c.</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Check if CS is required: <ul style="list-style-type: none"> <li>• Group 6 phase B monitor lights – ALL LIT.</li> <li>• Verify/stop all RCPs (may have been performed previously).</li> <li>• Check CS eductor suction flow – 1FI-CS014 &gt; 15 gpm.</li> <li>• Check CS eductor additive flow – 1FI-CS016 &gt; 5 gpm.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Verify total AF flow: <ul style="list-style-type: none"> <li>• AF flow &gt; 500 gpm.</li> <li>• Check S/G NR levels – NOT rising in an uncontrolled manner.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS valve alignment: <ul style="list-style-type: none"> <li>• Group 2 Cold Leg Injection monitor lights required for injection – LIT.</li> </ul> </li> </ul>	

Comments: \_\_\_\_\_

Scenario <b>NRC 2</b>		Event 7, 8
No:		No.
Event Description:		Steam leak inside containment/uncontrolled depressurization of ALL SGs, failure of both CS trains to automatically actuate
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS flow: <ul style="list-style-type: none"> <li>• High head SI flow &gt;100 gpm (1FI-917).</li> <li>• RCS pressure &lt; 1700 psig. <ul style="list-style-type: none"> <li>• SI pump discharge flows &gt; 200 gpm.</li> </ul> </li> <li>• RCS pressure &gt; 325 psig.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check PZR PORVs and spray valves: <ul style="list-style-type: none"> <li>• PORVs CLOSED.</li> <li>• PORV isolation valves – BOTH ENERGIZED.</li> <li>• PORV relief paths – BOTH PORVs in AUTO, PORV isolation valves OPEN.</li> <li>• Normal spray valves CLOSED.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check RCS temperatures: <ul style="list-style-type: none"> <li>• RCPs – NONE RUNNING. <ul style="list-style-type: none"> <li>• RCS Tcold temperatures are NOT stable at or trending to 557F. <ul style="list-style-type: none"> <li>• Stop dumping steam</li> <li>• Throttle AF flow while maintaining &gt; 500 gpm.</li> <li>• MSIVs open – verify closed (will not close). <ul style="list-style-type: none"> <li>○ Crew may throttle AF flow to 45 gpm per SG.</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check status of RCPs: <ul style="list-style-type: none"> <li>• RCPs – NONE RUNNING.</li> </ul> </li> </ul>
	CREW	<p>Check if SG secondary boundaries are intact:</p> <ul style="list-style-type: none"> <li>• Check NO SG depressurizing uncontrollably or completely depressurized. <ul style="list-style-type: none"> <li>• ALL SG pressures dropping in an uncontrolled manner.</li> </ul> </li> </ul>
	CREW	Transition to 1BwEP-2 “FAULTED STEAM GENERATOR ISOLATION.”

Comments: \_\_\_\_\_

Scenario No: <b>NRC 2</b>		Event No: <b>7</b>
Event Description: Steam leak inside containment/uncontrolled depressurization of ALL SGs		
Time	Position	Applicant's Actions or Behavior
		<b>1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION"</b>
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Request STA evaluation of status trees.</li> <li>• Enter/implement 1BwEP-2 and direct operator actions of 1BwEP-2 to establish the following conditions:</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Check Main Steamline Isolation: <ul style="list-style-type: none"> <li>• ALL MSIVs remain open (manual MS line isolation previously attempted).</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Check if any SG secondary pressure boundary intact: <ul style="list-style-type: none"> <li>• No SG pressure stable or rising.</li> <li>• ALL SGs depressurizing in an uncontrolled manner.</li> <li>• GO TO 1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL SGs."</li> </ul> </li> </ul>
	CREW	Transition to 1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS."

Comments: \_\_\_\_\_

Scenario No:	<b>NRC 2</b>	Event No:	<b>7</b>
Event Description: Steam leak inside containment/uncontrolled depressurization of ALL SGs			
Time	Position	Applicant's Actions or Behavior	
		<b>1BwCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS"</b>	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Enter/implement 1BwCA-2.1 and direct operator actions of 1BwCA-2.1 to establish the following conditions:</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check secondary pressure boundary: <ul style="list-style-type: none"> <li>MSIVs open – attempt to close (previously attempted).</li> <li>MSIV bypass valves – CLOSED.</li> <li>SG PORVs – CLOSED.</li> </ul> </li> <li>Check FW isolation monitor lights – LIT.</li> <li>Check 1SD002A-H – CLOSED.</li> <li>Check 1SD005A-D – CLOSED.</li> </ul>	
		<b>EXAMINER'S NOTE: Throttling AF flow to 45 gpm per SG will result in a red path on the heat sink status tree and require a transition to 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK." 1BwFR-H.1 will be entered and immediately exited due to operator action lowering AF flow to &lt; 500 gpm.</b>	
	BOP  [CT-33]	<ul style="list-style-type: none"> <li>Control feed flow to minimize RCS cooldown.</li> <li>Check cooldown rate in RCS cold legs &lt; 100 F in any 1 hour period – NO.</li> <li><b>Manually control AF flowrate to 45 gpm for each SG before orange path in integrity occurs. (Westinghouse – CT-33) (K/A number - EPEE12EA1.3 importance – 3.4/3.9)</b> <ul style="list-style-type: none"> <li><b>Throttle AF flow to 45 gpm per SG.</b></li> </ul> </li> <li>Check RCS hot leg temperatures – Stable or dropping.</li> <li>Check RCPs – NONE RUNNING.</li> <li>Check PZR PORVs and Isolation Valves: <ul style="list-style-type: none"> <li>PORV Isolation Valves – BOTH energized.</li> <li>PORVs – BOTH closed.</li> <li>PORV Isolation Valves – BOTH open.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check Secondary Radiation: <ul style="list-style-type: none"> <li>Reset Phase A.</li> <li>Open 1SD005A-D.</li> <li>Request Chemistry to periodically sample all SGs for activity.</li> <li>Check secondary radiation trends on RM-11 or PPC - ALL normal.</li> </ul> </li> </ul>	

Comments: \_\_\_\_\_



Scenario No: <b>NRC 2</b>		Event No: <b>7</b>
Event Description: Steam leak inside containment/uncontrolled depressurization of ALL SGs		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Check if RH Pumps Should be Stopped: <ul style="list-style-type: none"> <li>• RH pumps - BOTH running with suction on RWST.</li> <li>• If RCS pressure &gt; 325 psig and pressure is stable or rising, reset SI and stop RH pumps/place in standby.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: Terminate the scenario at Lead Examiner's discretion.</b>

(Final)

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Simulation Facility <u>Braidwood</u>	Scenario Operating Test No.: <b>151 NRC</b>
Examiners: _____	No.: <b>NRC 3</b>
_____	Applicant: _____ <u>SRO</u>
_____	_____ <u>ATC</u>
	_____ <u>BOP</u>
Initial Conditions: IC-21	
Turnover: Unit 1 is operating at 100% power, steady state, equilibrium xenon, BOL. 1B CW pump is OOS for motor inspection. Automatic Rod Control is failed (rod speed programmer failure). Rods are in MANUAL. IMD troubleshooting will commence in 3-4 hours. Following completion of turnover, the crew is to perform 1BwOS EH-M1 "UNIT 1 PUMP OPERABILITY SURVEILLANCE," using the preferred method of depressing and holding the MCB pushbutton. An Equipment Operator has been briefed and is standing by at the Unit 1 EH skid.	

Event No.	Malf. No.	Event Type	Event Description
Preload	IMF RX17 0 IOR ZDI1CW01PB PTL IMF FW44 IMF FW43 IMF SI12B IRF RP30 OUT IRF RP56 OUT trgset 1 "ZLO52BRKA(2) == 1" IMF FW19C 3.5 (1 0) IMF CV01B (1 0)		Rod speed programmer failure 1B CW pump OOS 1A AF pump fails to start 1B AF pump fails to start 1B SI pump fails to automatically start Phase A slave failure Phase A slave failure  1C feedline break inside Cnmt when reactor trips 1B CV pump trips when reactor trips
1	None	N-BOP, US	Perform 1BwOS EH-M1
2	IMF RX04E 0 120	I-BOP, US	Feed Flow channel, 1FT530, fails low
3	IMF CV29A 100	C-ATC, US TS-US	1A CV pump shaft shear
4	IMF SW01A	C-BOP, US TS-US	1A SX Pump Trip
5	IMF RX15 2195	I-ATC, US	Master Pressurizer Pressure Controller output fails to 2195 psig (0% demand)
6	IMF FW36 500 scfm to 120 scfm over 600 seconds	R-ATC, US	Condenser vacuum leak requiring load reduction
7	IMF CV03	C-ATC, US	Boric acid transfer pump trip
8	IMF RP09A	M-ALL	Inadvertent FWI Feed line break inside containment
9	Preload	C-ALL	1B CV pump trip when reactor trips
10	Preload	M-ALL	Loss of heat sink (1A/1B AF pumps tripped)

\*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

## SCENARIO OVERVIEW

Unit 1 is operating at 100% power, steady state, equilibrium xenon, BOL. 1B CW pump is OOS for motor inspection. Automatic Rod Control is failed (rod speed programmer failure). Rods are in MANUAL. IMD troubleshooting will commence in 3-4 hours. Following completion of turnover, the crew is to perform 1BwOS EH-M1 "UNIT 1 PUMP OPERABILITY SURVEILLANCE," using the preferred method of depressing and holding the MCB pushbutton. An Equipment Operator has been briefed and is standing by at the Unit 1 EH skid.

**After completing shift turnover and relief**, the BOP will perform 1BwOS EH-M1 "UNIT 1 PUMP OPERABILITY SURVEILLANCE."

**After completing the surveillance**, feed flow channel, 1FT-530, will fail low resulting in rising feed flow and opening of 1FW530, 1C S/G Feed Reg Valve, to match feed flow with steam flow. The BOP will diagnose the failure and take manual control of 1FW530 to restore 1C SG level. The US will enter 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL - ATTACHMENT G." The crew will take actions per hard card 1BwPR 1-15-SG & 1BwOA INST-2 and perform appropriate actions. The crew will swap to an operable feed flow channel.

**After addressing the failed feed flow channel**, the 1A CV pump shaft shear will occur. The crew will implement 1BwOA PRI-15 "LOSS OF NORMAL CHARGING." The crew will start the 1B CV pump to restore normal charging. Technical Specifications 3.5.2 Condition A and TRM 3.1.d Condition A apply.

**After the charging pump failure is addressed**, the 1A Essential Service Water (SX) pump will trip due to an overcurrent condition. The crew will take actions per hard card 1BwPR 1-2-A1 to start the 1B SX pump. The crew MAY enter 1BwOA PRI-8, ESSENTIAL SERVICE WATER MALFUNCTION. Tech Specs 3.7.8 Condition A applies. The 1A SX pump will remain unavailable for the rest of the scenario.

**After the 1A SX pump trip is addressed**, the master pressurizer pressure controller output will fail to 2195 psig (0% demand) in automatic. The RO will identify the failure and take manual control to restore pressurizer pressure.

**After the master pressurizer pressure controller failure has been addressed**, an air leak will develop in the main condenser. The crew will enter 1BwOA SEC-3 "LOSS OF CONDENSER VACUUM," dispatch operators to locate the leak and contact Engineering to evaluate the leakage. With the 1B CW pump OOS; the crew will be required to commence a ramp down of Unit 1 to stabilize the loss of vacuum.

**During the ramp**, the boric acid transfer pump will trip during the first boration. The common boric acid pump will not be available and the ATC will have to continue the ramp with rods only.

**After a sufficient reactivity manipulation has occurred**, an inadvertent FWI occurs. When the crew manually trips the reactor, a feed line break on the 1C SG inside containment will occur. The 1B CV pump trips when the reactor trips. The crew will enter 1BwEP-0 to stabilize the plant and SI will actuate. The 1B SI pump fails to auto start and must be manually started. The 1A and 1B AF pumps will not start resulting in a transition to 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" at step 15 of 1BwEP-0. Bleed and feed will be required due to NO CV pumps running.

**Completion criteria** is establishing bleed and feed during the loss of heat sink.

### Critical Tasks

1. Close containment isolation valves such that at least one valve is closed on each Phase A penetration before the end of the scenario. (Westinghouse CT-11) (K/A number APE069AA1.01 importance 3.5/3.7)
2. Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for SI pump injection to occur. (Westinghouse CT-46) (K/A number EPEE05EA1.1 importance 4.1/4.0)

## SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-21, 100% power, steady state, equilibrium xenon, BOL OR use the IC written below.
- Verify/place OA & OC VA plenums in service, 0B VA plenum in standby.
- Place ROD BANK SELECT switch in MANUAL.
- Place YELLOW on-line risk sign on 1PM05J.
- Update PARAGON to BOL with RODS in MANUAL.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Place 1B CW pump C/S in PTL, after 1CW001B is full closed, then run CAE.
- Hang OOS card on 1B CW pump.
- Run **caep 151 NRC 3 SETUP** from disk and verify the following actuate:
  - **IMF RX17 0**
  - **IOR ZDI1CW01PB PTL**
  - **IMF FW44**
  - **IMF FW43**
  - **IMF SI12B**
  - **IRF RP30 OUT**
  - **IRF RP56 OUT**
  - **trgset 1 "ZLO52BRKA(2) == 1"**
  - **IMF FW19C 3.5 (1 0)**
  - **IMF CV01B (1 0)**
- After main generator load stabilizes, write an IC to allow the scenario to be used again.
- Provide students with turnover sheets.

**Event 1: Perform 1BwOS EH-M1.**

When requested, as Equipment Operator, report you are standing by at the Unit 1 EH skid. Report the following data as EH pumps are started and stopped:

- EH system temperature is 110°F.
- EH system pressure is 1970 psig with ONE EH pump running.
- EH system pressure is 1985 psig with TWO EH pumps running.

If requested, as Field Supervisor report you are providing direct supervision in the field for production risk.

Acknowledge as Shift Manager, the start and completion of procedure.

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**Event 2: Feed flow channel, 1FT-530, fails low.**

Insert **IMF RX04E 0 120** to fail 1FT-530 low over 120 seconds.

As SM, acknowledge the failure, requests for on-line risk assessment, maintenance support, and IR initiation.

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**Event 3: 1A CV pump shaft shear.**

Insert **IMF CV29A 100** for 1A CV pump shaft shear.

If dispatched as Equipment Operator to 1A CV pump and/or pump breaker, wait three minutes and report 1A CV pump appears shaft is sheared.

If dispatched as Equipment Operator to check for a good start on the 1B CV pump, report that the 1B CV pump had a good start.

Acknowledge as Shift Manager the failure, LCOAR entry, on-line risk assessment, EAL evaluation, request for maintenance support, and IR request.

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**Event 4: 1A SX pump trip.**

Insert **IMF SW01A** for 1A SX pump trip.

If dispatched as EO to investigate 1A SX pump breaker, wait 2 minutes and report phase A overcurrent flag on 1A SX pump breaker cubicle (Bus 141, cubicle 2).

If dispatched as EO to investigate 1A SX pump, wait 3 minutes and report no damage visible at pump and pump is NOT rotating backwards. Report 1B SX pump is running with normal parameters if dispatched to check 1B SX pump.

If contacted as Unit 2 to swap Unit 2 SX pumps for chem. feed alignment, acknowledge request.

If contacted as Rad Waste Operator, report no abnormal Aux Building sump indications.

As SM, acknowledge the trip of 1A SX pump, Tech Spec 3.7.8 Condition A entry, and requests for on-line risk assessment, maintenance support, and IR initiation.

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**Event 5: Master Pressurizer Pressure Controller fails to 2195 psig (0% demand).**

Insert **IMF RX15 2195** to fail the master pressurizer pressure controller output low.

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**Event 6: Lowering condenser vacuum requiring load drop.**

Insert **IMF FW36 500 SCFM lowering to 120 SCFM over 600 seconds.**

As SM, acknowledge 1BwOA SEC-3 entry, request for E Plan evaluation, load ramp and requests for on-line risk assessment, maintenance support, and IR initiation.

If contacted as Engineering to evaluate lowering vacuum, inform the unit supervisor that an Engineer is evaluating the Unit 1 lowering condenser vacuum.

Acknowledge dispatch of EOs to investigate the lowering condenser vacuum. After approximately 10 minutes, report the sound of air leak coming from under the 1C LP turbine.

If contacted as Unit 2, acknowledge the request for use of the Unit 2 boric acid transfer pump and inform Unit 1 it will be 30 to 60 minutes before it will be available.

If contacted as Reactor Engineering, acknowledge the ramp being performed with rods only. If asked for permission to ramp or for guidance to ramp with rods only. Inform Unit 1 you will develop a plan to recover to the desired rod alignment once the transient is over and boric acid is restored.

**Once the ramp has commenced, monitor condenser pressure in SimView (YCP2205/06/07) to ensure a ramp is required, but vacuum doesn't degrade to the reactor trip set point. Adjust MF FW36 severity as required.**

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**Event 7: Trip of the unit 1 boric acid pump.**

Once the first boration has been started:

Insert **IMF CV03** to trip the boric acid transfer pump.

As SM, acknowledge loss of Unit 1 boric acid pump and requests for on-line risk assessment, maintenance support, and IR initiation.

As the EO, report that the boric acid pump is hot to the touch and an acrid odor is in the air. There is no fire and the breaker is tripped free.

As the Field Supervisor or EO, acknowledge the need to swap to the Unit 0 boric acid pump on Unit 1 per BwOP AB-23 step F.1. After 3 minutes, call to report the power cord for the Unit 0 AB pump is damaged and not usable.

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**Event 8: Inadvertent Feed Water Isolation.**

Insert **IMF RP09A**.

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**Event 9/10: Feed line break in containment / Loss of Heat Sink / CV pump trip.**

Acknowledge as SM procedure transitions, E Plan evaluations, and STA request.

After STA requested, as STA report CSF status – Red path on heat sink (until feed flow established). Yellow on heat sink once feed flow established, Yellow on inventory when vessel head voids due to bleed and feed.

If dispatched as EO, report 1B CV pump has phase C overcurrent flag.

If dispatched as EO, report 1A AF pump has a ground overcurrent flag and motor damage.

If dispatched as EO, report 1B AF pump has large lube oil leak and engine damage.

Acknowledge as U-2 NSO, the request to remove FW isolation fuses; then insert the following:

- **MRF FW150 REMOVED**
- **MRF FW151 REMOVED**
- **MRF RP78 REMOVED**
- **MRF RP79 REMOVED**

Acknowledge as EO to start startup FW pump aux oil pump and insert the following:

- **MRF FW149 START**

Scenario No: <b>NRC 3</b>		Event No: <b>1</b>
Event Description: <b>Perform 1BwOS EH-M1</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>From turnover, perform 1BwOS EH-M1 "UNIT 1 PUMP OPERABILITY SURVEILLANCE."</li> </ul>
	US	<ul style="list-style-type: none"> <li>Direct BOP to perform 1BwOS EH-M1.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Refer to 1BwOS EH-M1.</li> <li>Record initial data on Data Sheet D-2.</li> <li>Notify Equipment Operator at EH skid of pending 1B EH pump start.</li> <li>At 1PM02J, depress EH PP LO PRESS AUTO START TEST (20/MPT) pushbutton. <ul style="list-style-type: none"> <li>Equipment Operator locally verifies 1B EH pump started.</li> </ul> </li> <li>Perform the following at 1PM02J: <ul style="list-style-type: none"> <li>Verify annunciator 1-18-B15, EH SYSTEM TROUBLE, remained clear.</li> <li>Place 1B EH pump C/S in AFTER CLOSE.</li> </ul> </li> <li>Notify Equipment Operator at EH skid of pending 1A EH pump shutdown.</li> <li>At 1PM02J, place 1A EH pump C/S in AFTER TRIP.</li> <li>Equipment Operator locally verify EH pressure 1950 ± 50 psig.</li> <li>Notify Equipment Operator at EH skid of pending 1A EH pump start.</li> <li>At 1PM02J, depress EH PP LO PRESS AUTO START TEST (20/MPT) pushbutton. <ul style="list-style-type: none"> <li>Equipment Operator locally verifies 1A EH pump started.</li> </ul> </li> <li>Perform the following at 1PM02J: <ul style="list-style-type: none"> <li>Verify annunciator 1-18-B15, EH SYSTEM TROUBLE, remained clear.</li> <li>Place 1A EH pump C/S in AFTER TRIP.</li> </ul> </li> <li>Equipment Operator locally verifies EH pressure 1950 ± 50 psig.</li> <li>Record as left data on Data Sheet D-2.</li> <li>Inform US that 1BwOS EH-M1 complete.</li> </ul>
	US	<ul style="list-style-type: none"> <li>Acknowledge report of surveillance completion.</li> <li>Notify SM that 1BwOS EH-M1 is complete.</li> </ul>
		<b>EXAMINER'S NOTE: After 1BwOS EH-M1 is complete and with Lead Examiner's concurrence, enter next event.</b>

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Scenario <b>NRC 3</b>		Event <b>2</b>
No:		No.
Event Description: Feed flow channel, 1FT-530, fails low		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator S/G 1C FLOW MISMATCH FW FLOW LOW (1-15-C4)</li> <li>• Annunciator S/G 1C LEVEL DEVIATION HIGH/LOW (1-15-C9)</li> <li>• 1C SG NR levels rising.</li> <li>• FW flow rising on feed flow meter, 1FI-531A.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Identify/report failure of 1FT-530.</li> <li>• Place 1C FRV (1FW530) in manual and restore SG level per 1BwPR 1-15-SG.</li> <li>○ Reference BwARs as time permits.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>○ Reference BwARs as time permits.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Enter/implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL," ATTACHMENT G "FEEDWATER FLOW CHANNEL FAILURE" and direct operator actions of 1BwOA INST-2 to establish the following conditions:</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Stabilize 1C SG level (actions to stabilize per 1BwPR 1-15-SG initially, then 1BwOA INST-2).</li> <li>• If SG level abnormal: <ul style="list-style-type: none"> <li>• Control 1C FRV (1FW530) in manual.</li> <li>• Restore SG level to stable condition.</li> </ul> </li> <li>• Select operable feed flow channel (1BwPR 1-15-SG action).</li> <li>• Establish/verify automatic SG level control.</li> <li>• Check reactor power &lt;100% (if &gt; 100%, reduce turbine load): <ul style="list-style-type: none"> <li>• PPC 10 min. calorimetric.</li> <li>• Computer point (U0923).</li> <li>• NIs.</li> </ul> </li> <li>• Check HD system operation: <ul style="list-style-type: none"> <li>• 1HD046A &amp; B position normal.</li> </ul> </li> </ul>

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Scenario <b>NRC 3</b>		Event <b>2</b>
No:		No.
Event Description: Feed flow channel, 1FT-530, fails low		
Time	Position	Applicant's Actions or Behavior
	US	<ul style="list-style-type: none"> <li>• Notify SM/maintenance to investigate/correct the failed feed flow channel: <ul style="list-style-type: none"> <li>• Determines Tech Specs are NOT applicable.</li> <li>• Contact SM to perform risk assessment, initiate IR, reactivity screening, notify QNE and contact maintenance to investigate/correct instrument failure.</li> <li>• Contact SM to make appropriate personnel notifications.</li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: After the feed flow channel failure actions are complete and with Lead Examiner's concurrence, enter next event.</b>

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Scenario <b>NRC 3</b>		Event No. <b>3</b>
Event Description: <b>1A CV pump shaft shear</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator CHG LINE FLOW HIGH/LOW (1-9-D3)</li> <li>• Annunciator RCP SEAL WATER INJ FLOW LOW (1-7-B2)</li> <li>• Annunciator REGEN HX LTDWN TEMP HIGH (1-9-A1)</li> <li>• PZR level lowering.</li> <li>• Low amps on the 1A CV pump.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Identify 1A CV pump has low amps at 1PM05J.</li> <li>• Report failure to US. <ul style="list-style-type: none"> <li>○ May isolate letdown per BwAR 1-9-A1, hard card 1BwPR 1-9-LD or 1BwOA PRI-15 Operator Action Summary page by closing 1CV8149A/B/C and 1CV459/460.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Reference BwARs as time permits. <ul style="list-style-type: none"> <li>○ Identify entry conditions for 1BwOA PRI-15 "LOSS OF NORMAL CHARGING."</li> </ul> </li> <li>• Dispatch operator to investigate cause of 1A CV pump low amps.</li> </ul>
	US	<p>Enter 1BwOA PRI-15 to start 1B CV pump.</p> <ul style="list-style-type: none"> <li>• Notify Shift Manager of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Implement 1BwOA PRI-15 and direct operator actions of 1BwOA PRI-15 to establish the following conditions: <ul style="list-style-type: none"> <li>○ Enter Tech Spec 3.4.1 Condition A if PZR pressure &lt; 2209 psig.</li> </ul> </li> </ul>
<b>EXAMINER'S NOTE: Crew may stop the 1A CV pump due to abnormal indications.</b>		
	ATC	<p>Perform the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Check CV pump status: <ul style="list-style-type: none"> <li>○ If one CV pump is running (CV pump may or may not be tripped before entering the 1BwOA PRI-15). <ul style="list-style-type: none"> <li>• Check CV pump parameters any fluctuating – NO.</li> <li>• CV pump discharge pressure on 1PI-120A is less than RCS pressure: <ul style="list-style-type: none"> <li>• Place 1CV121 controller to manual.</li> <li>• Place 1A CV pump C/S in PULL OUT.</li> <li>• Start 1B CV pump.</li> <li>• Place 1CV121 controller in auto (if desired).</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>OR</p>
	ATC	<ul style="list-style-type: none"> <li>○ If NEITHER CV pump is running. <ul style="list-style-type: none"> <li>• Place 1A CV pump C/S in PULL OUT.</li> <li>• Isolate normal letdown:</li> </ul> </li> </ul>

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Scenario <b>NRC 3</b>		Event <b>3</b>
No:		No.
Event Description: <b>1A CV pump shaft shear</b>		
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• CLOSE 1CV8149A, B &amp; C, letdown orifice isolation valves.</li> <li>• CLOSE 1CV459 &amp; 1CV460, letdown isolation valves.</li> <li>• Check VCT status: <ul style="list-style-type: none"> <li>• Check 1CV112B &amp; 1CV112C, VCT suction valves, OPEN.</li> <li>• Maintain VCT level greater than 20%. <ul style="list-style-type: none"> <li>○ Operate RMCS in automatic or manual to maintain VCT level &gt; 20%.</li> </ul> </li> <li>• Check annunciator 1-9-C2, VCT TEMP HIGH - NOT lit.</li> </ul> </li> <li>○ Acknowledge RM-11 alarm caused by isolating flow to 1PR06J, Gross Failed Fuel Monitor.</li> </ul> <p>Perform the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Check for gas binding of previously running CV pump by verifying the following trends NOT fluctuating prior to pump trip (may use PPC trends): <ul style="list-style-type: none"> <li>• RCP #1 seal leak off flows.</li> <li>• CV pump flow.</li> <li>• CV pump discharge pressure.</li> <li>• CV pump amps.</li> </ul> </li> <li>• Restore charging flow: <ul style="list-style-type: none"> <li>• Check 1CV8110 &amp; 1CV8116, 1B CV pump miniflow isolation valves – OPEN.</li> <li>• Check RCS pressure approximately 2235 psig.</li> <li>• Start 1B CV pump.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check CV System Alignment: <ul style="list-style-type: none"> <li>• Verify 1CV8147, charging to RC 1A loop isolation valve – OPEN.</li> <li>• Verify 1CV8324A, charging to regen HX 1A isolation valve – OPEN.</li> <li>• Verify/open 1CV8105 and 1CV8106, charging line CNMT isolation valves.</li> <li>• Check charging flow established (charging flow may be at minimum for RCP seal injection due to letdown isolation).</li> <li>• Determine normal letdown is isolated (restore letdown, see next page).</li> </ul> </li> <li>○ Monitor RMCS during automatic VCT makeup: <ul style="list-style-type: none"> <li>○ Proper flow on PW/Total Flow (1FT-0111) and Boric Acid Flow (1FT-0110) on recorder 1FR-0110.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BWOA ESP-2 "REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify Shift Manager of plant status and procedure entry.</li> <li>• Implement 1BWOA ESP-2 "REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS," and direct operator actions of 1BWOA ESP-2 to establish the following conditions:</li> </ul>

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Scenario No:	<b>NRC 3</b>	Event No:	3
Event Description:	1A CV pump shaft shear		
Time	Position	Applicant's Actions or Behavior	
	BOP	<p>Restore normal letdown using 1BwOA ESP-2 as directed by performing the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Check letdown isolated: <ul style="list-style-type: none"> <li>• Verify 1CV8149A, B, &amp; C, letdown orifice isolation valves - CLOSED.</li> <li>• Verify 1CV459 &amp; 1CV460, letdown line isolation valves - CLOSED.</li> </ul> </li> <li>• Check letdown flow path: <ul style="list-style-type: none"> <li>• Verify 1CV8401A, letdown HX 1A isolation valve - OPEN.</li> <li>• Verify 1CV8324A, charging to regen HX 1A isolation valve – OPEN.</li> <li>• Verify 1CV8389A, letdown to regen HX 1A isolation valve – OPEN.</li> <li>• Verify 1CV8152 &amp; 1CV8160, letdown line CNMT isolation valves – OPEN.</li> <li>• Verify BTRS mode select switch OFF light - LIT.</li> </ul> </li> <li>• Align letdown controllers: <ul style="list-style-type: none"> <li>• Place 1PK-131, letdown line pressure controller, in MANUAL and raise demand to 40%.</li> <li>• Place 1CC130A, letdown HX outlet temperature controller, in MANUAL and raise demand to 60%.</li> </ul> </li> <li>• Verify charging flow established: <ul style="list-style-type: none"> <li>• Verify 1CV8105 and 1CV8106, charging line CNMT isolation valves - OPEN.</li> <li>• Throttle 1CV182, charging header backpressure control valve, to establish 8-13 gpm RCP seal injection flow.</li> <li>• Place 1FK-121, in manual and operate 1FK-121 in manual to establish <math>\geq</math> 100 gpm charging flow on 1FI-121A.</li> </ul> </li> <li>• Establish letdown flow: <ul style="list-style-type: none"> <li>• OPEN 1CV459 &amp; 1CV460, letdown line isolation valves.</li> <li>• OPEN 1CV8149A/B/C, letdown orifice isolation valves, as necessary to establish 120 gpm letdown flow.</li> <li>• Lower demand on 1PK-131, letdown line pressure controller, to raise letdown pressure to approximately 360 psig on 1PI-131.</li> <li>• Operate 1FK-121 in manual to restore PZR level to normal operating band and maintain 8-13 gpm RCP seal injection flow.</li> <li>• Lower demand on 1CC130A, to control letdown temperature between 90° to 115°F on 1TI-130.</li> <li>• Place 1PK-131, letdown line pressure controller, in AUTO.</li> <li>• Place 1CC130A, letdown HX outlet temperature controller, in AUTO.</li> <li>• At the RM-11, verify 1PR06J rad monitor status is GREEN.</li> </ul> </li> </ul>	

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Scenario No:	<b>NRC 3</b>	Event No:	3
Event Description:	1A CV pump shaft shear		
Time	Position	Applicant's Actions or Behavior	
	US	<ul style="list-style-type: none"> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> <li>• Determine Tech Spec 3.5.2 Condition A is applicable.</li> <li>• Determine TRM 3.1.d Condition A is applicable.</li> </ul>	
		<b>EXAMINER'S NOTE: After the 1A CV pump shaft shear actions are complete and with Lead Examiner's concurrence, enter next event.</b>	

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Scenario No:	<b>NRC 3</b>	Event No:	4
Event Description:	1A Essential Service Water (SX) pump trip		
Time	Position	Applicant's Actions or Behavior	
		<b>EXAMINER'S NOTE: The crew will start the standby SX pump per hard card 1BwPR 1-2-A1, BwAR 1-2-A1 OR MAY elect to enter 1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION" to address the 1A SX pump trip. Actions for 1BwOA PRI-8 start in italics below.</b>	
	CUE	<ul style="list-style-type: none"> <li>• Annunciator SX PUMP TRIP (1-2-A1)</li> <li>• Annunciator SX PUMP DSCH HDR PRESS LOW (1-2-A2)</li> <li>• 1A SX pump trip light – LIT.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Determine 1A SX pump tripped.</li> <li>• Use hard card 1BwPR 1-2-A1 to perform the following actions: <ul style="list-style-type: none"> <li>• Start the standby (1B) SX pump (1SX001B/16B/27B must be open to allow a manual pump start). <ul style="list-style-type: none"> <li>• Place 1B SX pump control switch to start and hold until the lube oil pressure interlock is met and 1B SX pump starts.</li> </ul> </li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Reference BwAR 1-2-A1, SX PUMP TRIP: <ul style="list-style-type: none"> <li>• Verify 1B SX pump started.</li> <li>• Verify voltage on ALL 3 phases on 4KV bus &gt; 3990 volts.</li> <li>• If SX flow cannot be restored, enter 1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION." <ul style="list-style-type: none"> <li>○ Place 1A SX pump C/S in PTL.</li> <li>○ Refer to BwOP SX-1/2.</li> </ul> </li> <li>○ Verify annunciator SX PUMP DSCH HDR PRESS LOW (1-2-A2) is NOT LIT.</li> <li>○ Restart the 1A containment chiller.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>○ Refer to BwARs as time permits.</li> <li>○ Dispatch EO to 1A &amp; 1B SX pumps.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Determine Tech Spec 3.7.8 Condition A is applicable.</li> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct failure.</li> <li>○ Inform Unit 2 to swap SX pumps for proper Chem Feed alignment.</li> </ul>	
	CREW	<b><i>1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION"</i></b> <ul style="list-style-type: none"> <li>○ <i>Identify entry conditions for 1BwOA PRI-8 "ESSENTIAL SERVICE WATER MALFUNCTION."</i></li> <li>○ <i>Dispatch operators to investigate status of 1A SX pump and breaker.</i></li> </ul>	

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Scenario <b>NRC 3</b>		Event No. 4
Event Description: 1A Essential Service Water (SX) pump trip		
Time	Position	Applicant's Actions or Behavior
	US	<ul style="list-style-type: none"> <li>○ Notify SM of plant status and procedure entry.</li> <li>○ Request SM evaluation of Emergency Plan conditions.</li> <li>○ Enter/implement 1BwOA PRI-8 and direct operator actions to establish the following conditions:</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>○ Check for excessive leakage in Aux Building: <ul style="list-style-type: none"> <li>○ Contact Radwaste to monitor Aux Building sumps.</li> <li>○ Annunciator SX PUMP SUCT VLV PIT LEVEL HIGH (1-2-D2) – NOT LIT.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>○ Check status of SX pumps at 1PM06J: <ul style="list-style-type: none"> <li>○ Start 1B SX pump if not already running.</li> </ul> </li> <li>○ Check status of SX system at 1PM06J: <ul style="list-style-type: none"> <li>○ Annunciator SX PUMP SUCT PRESS LOW (1-2-C1) – NOT LIT.</li> <li>○ Annunciator SX STRN DP HIGH (1-2-C2) – NOT LIT.</li> <li>○ Annunciator SX PUMP DSCH HDR PRESS LOW (1-2-A2) – NOT LIT.</li> <li>○ Annunciator SX PUMP DSCH HDR TEMP HIGH LOW (1-2-B2) – NOT LIT.</li> <li>○ 1A SX pump NOT rotating backwards.</li> </ul> </li> <li>○ Check for SX leakage into containment at 1PM06J: <ul style="list-style-type: none"> <li>○ Annunciator CNMT DRAIN LEAK DETECT FLOW HIGH (1-1-A2) – NOT LIT.</li> </ul> </li> <li>○ Check CC outlet temperatures &lt; 105°F at 1PM06J (1TI-674, 0TI-675).</li> <li>○ Check RCP cooling at 1PM05J: <ul style="list-style-type: none"> <li>○ Annunciator RCP THERM BARR CC WTR TEMP HIGH (1-7-E3) – NOT LIT.</li> <li>○ Annunciator RCP BRNG CC WTR TEMP HIGH (1-7-E5) – NOT LIT.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>○ Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> <li>○ Determine Tech Spec 3.7.8 Condition A is applicable.</li> </ul>
<b>EXAMINER'S NOTE: After the actions for the 1A SX pump trip are complete and with Lead Examiner's concurrence, insert next event.</b>		

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Scenario No:	<b>NRC 3</b>	Event No:	5
Event Description:	Master pressurizer pressure controller output fails to 2195 psig (0% demand)		
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>• Annunciator PZR PRESS CONT DEV LOW HTRS ON (1-12-C1)</li> <li>• PZR pressure, 1PI-455A/456/457/458, rising.</li> <li>• Master PZR pressure controller demand at 0%.</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Identify/report failure of Master pressurizer pressure controller.</li> <li>• Perform actions per BwAR 1-12-C1: <ul style="list-style-type: none"> <li>• Monitor PZR pressure and level channels.</li> <li>• Verify PZR spray valves closed.</li> <li>• Check PZR heaters for proper operation.</li> <li>• Take manual control to restore PZR pressure - place 1PK-455A in manual and raise demand prior to PZR PORVs automatically opening.</li> </ul> </li> <li>• Control PZR pressure manually throughout scenario.</li> </ul>	
		<b>EXAMINER'S NOTE: The crew should establish a normal pressure control band to maintain (approximately 2235 psig +/- 15 psig).</b>	
	CREW	<ul style="list-style-type: none"> <li>○ Refer to other BwARs as time permits.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>○ Enter Tech Spec 3.4.1 Condition A if PZR pressure drops below 2209 psig.</li> <li>• Notify SM of plant status and the need for maintenance assistance.</li> </ul>	
		<b>EXAMINER'S NOTE: After the actions for the Master Pressurizer Pressure Controller failure are complete and with Lead Examiner's concurrence, insert next event.</b>	

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Scenario No:	<b>NRC 3</b>	Event No.	6 & 7
Event Description: Lowering condenser vacuum requires load to be lowered with rods only due to boric acid transfer pump trip and common boric acid pump unavailable			
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>Annunciator SECONDARY SAMPLING PANEL/SINK TROUBLE (1-1-B7)</li> <li>Exhaust hood, 1PI-ES043/46/49, (condenser pressure) rising/degrading.</li> <li>Annunciator CNDSR VACUUM LOW (1-18-D4)</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Recommend entry to 1BWOA SEC-3 "LOSS OF CONDENSER VACUUM."</li> </ul>	
	US	<ul style="list-style-type: none"> <li>Direct actions of 1BWOA SEC-3.</li> <li>Notify Shift Manager of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Notify Engineering to track condenser pressure.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check CW system: <ul style="list-style-type: none"> <li>CW flow normal – NO. <ul style="list-style-type: none"> <li>1B CW pump discharge valve closed.</li> <li>1A/1C CW pump discharge valves open.</li> </ul> </li> <li>With condenser pressure rising, perform the following to reduce turbine load to stabilize condenser pressure (use U-1 Contingency ReMAs Op Aid for guidance): <ul style="list-style-type: none"> <li>Select SETPOINT.</li> <li>Set REFERENCE DEMAND: <ul style="list-style-type: none"> <li>Select REF DEMAND.</li> <li>Enter desired value.</li> <li>Select left ENTER.</li> </ul> </li> <li>Set LOAD RATE: <ul style="list-style-type: none"> <li>Select RATE.</li> <li>Enter desired rate.</li> <li>Select right ENTER.</li> </ul> </li> <li>Initiate ramp: <ul style="list-style-type: none"> <li>Select GO/HOLD.</li> <li>Select GO.</li> </ul> </li> </ul> </li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Monitor condenser pressure: <ul style="list-style-type: none"> <li>Check Figure 1BWOA SEC-3-1 for acceptable operation.</li> <li>Check condenser pressure &gt; 5.5" HgA.</li> <li>Check DEHC – MW OUT SELECTED.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Prepare reactivity plan to recommend to US for ramp (use U-1 Contingency ReMAs Op Aid for guidance).</li> </ul>	

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Scenario No:	<b>NRC 3</b>	Event No:	6 & 7
Event Description: Lowering condenser vacuum requires load to be lowered with rods only due to boric acid transfer pump trip and common boric acid pump unavailable			
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• Determine required boric acid volume.</li> <li><b>Borate in Automatic (BwOP CV-6 hard card):</b> <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters to equalize boron concentration.</li> <li>• Set 1FY-0110 BA Blender Predet Counter to desired value.</li> <li>• Set 1FK-110 BA Flow Control to desired boration rate</li> <li>• Place MAKE-UP MODE CONT SWITCH to STOP position.</li> <li>• Place MODE SELECT SWITCH to BORATE position.</li> <li>• Place MAKE-UP MODE CONT SWITCH to START.</li> <li>• Verify the following occurs: <ul style="list-style-type: none"> <li>• 1CV110B opens.</li> <li>• 1CV110A opens.</li> <li>• BA pump starts.</li> <li>• Proper BA flow on recorder 1FR-110.</li> </ul> </li> <li>• When desired boration is achieved, place MAKE-UP MODE CONT SWITCH to STOP.</li> <li>• Verify the following occurs: <ul style="list-style-type: none"> <li>• 1CV110B closes.</li> <li>• 1CV110A closes.</li> <li>• BA pump stops.</li> </ul> </li> <li>• Record time and amount of BA addition.</li> <li>• Perform BwOP CV-7 to return RMCS to AUTO following the final boration.</li> </ul> </li> <li>OR</li> <li><b>Batch addition of Boric Acid (BwOP CV-6 hard card):</b> <ul style="list-style-type: none"> <li>○ Turn on PZR backup heaters to equalize boron concentration.</li> <li>○ Momentarily depress RESET pushbutton on BA Flow totalizer.</li> <li>• Open 1CV110B.</li> <li>• Open 1CV110A.</li> <li>• Start the BA Transfer Pump.</li> <li>○ If desired, control VCL level by adjusting 1LK-112 setpoint to desired value.</li> <li>• When desired amount of BA has been added, stop the BA Transfer Pump</li> <li>• Close 1CV110A.</li> <li>• Close 1CV110B.</li> <li>• Verify VCT level/pressure at desired value and adjust 1LK-112 setpoint to desired corresponding level setpoint.</li> <li>• Place 1CV110A/1CV110B in AUTO.</li> <li>• Record time and amount of BA addition.</li> <li>• Perform BwOP CV-7 to return RMCS to AUTO following the final boration.</li> <li>○ May flush boric acid lines per BwOP CV-6 step. F.5.</li> </ul> </li> <li>• When the U-1 boric acid transfer pump trips, attempt to align to the U-0 boric acid</li> </ul>	

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Scenario No:	<b>NRC 3</b>	Event No:	6 & 7
Event Description: Lowering condenser vacuum requires load to be lowered with rods only due to boric acid transfer pump trip and common boric acid pump unavailable			
Time	Position	Applicant's Actions or Behavior	
		transfer pump. <ul style="list-style-type: none"> <li>• After the U-1 boric transfer pump trip, continue load ramp on rods only.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Bypass CP demins: <ul style="list-style-type: none"> <li>• Open 1CD210A/B.</li> </ul> </li> <li>• Restore condenser vacuum: <ul style="list-style-type: none"> <li>○ Start at least one hogging vacuum pump.</li> <li>○ Place 2<sup>nd</sup> set of air ejectors in-service.</li> </ul> </li> <li>• Check condenser pressure: <ul style="list-style-type: none"> <li>• Acceptable per Figure 1BWOA SEC-3-1.</li> <li>• Condenser pressure stable or dropping.</li> <li>• Check C-9 bypass permissive light - NOT LIT.</li> </ul> </li> <li>• Identify and isolate leak.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Request Chemistry to check dissolved oxygen levels.</li> <li>• Determine condenser status.</li> <li>• Contact SM to perform risk assessment, initiate IR, reactivity screening and contact maintenance to investigate/correct instrument failure.</li> </ul>	
		<b>EXAMINER'S NOTE: After an acceptable load ramp has occurred and with Lead Examiner's concurrence, insert next event.</b>	

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Scenario No:	<b>NRC 3</b>	Event No:	8
Event Description:	Inadvertent FWI & feed line break inside containment		
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>Annunciator FWIV NOT FULL OPEN (1-1-A4) (1-15-E7)</li> <li>FWI monitor lights - ALL lit.</li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>Recognize a FWI has occurred and conditions requiring a manual reactor trip exist.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>Direct a manual Rx trip.</li> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Implement 1BwEP-0 "REACTOR TRIP OR SI."</li> <li>Direct operator actions of 1BwEP-0 to establish the following conditions:</li> </ul>	
	ATC	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>Verify reactor trip:               <ul style="list-style-type: none"> <li>Rod bottom lights - ALL LIT.</li> <li>Reactor trip &amp; Bypass breakers – OPEN.</li> <li>Neutron flux – DROPPING.</li> </ul> </li> </ul>	
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM02J or OWS drop 210: <ul style="list-style-type: none"> <li>Verify turbine trip:               <ul style="list-style-type: none"> <li>All Turbine throttle valves – CLOSED.</li> <li>All Turbine governor valves – CLOSED.</li> </ul> </li> </ul>	
	BOP	Perform immediate operator actions of 1BwEP-0 at 1PM01J: <ul style="list-style-type: none"> <li>Verify power to 4KV busses:               <ul style="list-style-type: none"> <li>ESF Buses – BOTH ENERGIZED.</li> </ul> </li> </ul>	
	CREW	Perform immediate operator actions of 1BwEP-0 at 1PM05J: <ul style="list-style-type: none"> <li>Check SI Status (Cnmt pressure SI/1C SG pressure cannot be maintained &gt; 640 psig).               <ul style="list-style-type: none"> <li>SI First OUT annunciator – LIT.</li> <li>SI ACTUATED Permissive Light – LIT.</li> <li>SI Equipment – AUTOMATICALLY ACTUATED:                   <ul style="list-style-type: none"> <li>Either SI pump – RUNNING.</li> <li>Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.</li> </ul> </li> </ul> </li> <li>Manually actuate SI at 1PM05J &amp; 1PM06J.</li> </ul>	

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Scenario No:	<b>NRC 3</b>	Event No:	9 & 10
Event Description:	Feed line break inside containment & loss of heat sink/1B CV pump trip		
Time	Position	Applicant's Actions or Behavior	
		<p><b>EXAMINER'S NOTE: Per the 1BwEP-0 Operator Action Summary page, RCP trip criteria is applicable throughout the performance of 1BwEP-0. The crew may trip RCPs whenever the criteria of RCS pressure &lt;1425 psig AND high head SI flow &gt;100 gpm are recognized.</b></p>	
		<p><b>EXAMINER'S NOTE: US and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.</b></p>	
	BOP	<p><b>1BwEP-0 ATTACHMENT B:</b></p> <ul style="list-style-type: none"> <li>• Verify FW isolated at 1PM04J: <ul style="list-style-type: none"> <li>• FW pumps – TRIPPED.</li> <li>• FW isolation monitor lights – LIT.</li> <li>• FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.</li> </ul> </li> <li>• Verify DGs running at 1PM01J: <ul style="list-style-type: none"> <li>• DGs – BOTH RUNNING.</li> <li>• 1SX169A/B OPEN.</li> <li>• Dispatch operator locally to check operation.</li> </ul> </li> <li>• Verify Generator Trip at 1PM01J: <ul style="list-style-type: none"> <li>• OCB 1-8 and 7-8 open.</li> <li>• PMG output breaker open.</li> </ul> </li> <li>• Verify Control Room ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.</li> <li>• Operating VC train equipment – RUNNING. <ul style="list-style-type: none"> <li>• 0B Supply fan</li> <li>• 0B Return fan</li> <li>• 0B M/U fan</li> <li>• 0B Chilled water pump</li> <li>• 0B Chiller</li> </ul> </li> <li>• Operating VC train dampers – ALIGNED. <ul style="list-style-type: none"> <li>• M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.</li> <li>• 0B VC train M/U filter light – LIT.</li> <li>• 0VC09Y – OPEN.</li> <li>• 0VC313Y – CLOSED.</li> </ul> </li> <li>• Operating VC train Charcoal Absorber aligned for train B. <ul style="list-style-type: none"> <li>• 0VC44Y – CLOSED.</li> <li>• 0VC05Y – OPEN.</li> <li>• 0VC06Y – OPEN.</li> </ul> </li> </ul> </li> <li>• Control Room pressure greater than +0.125 inches water on 0PDI-VC038.</li> </ul>	

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Scenario <b>NRC 3</b>		Event 9 & 10
No:		No.
Event Description: Feed line break inside containment & loss of heat sink/1B CV pump trip		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• Verify Auxiliary Building ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• Two inaccessible filter plenums aligned. <ul style="list-style-type: none"> <li>• Plenum A: <ul style="list-style-type: none"> <li>• 0VA03CB - RUNNING.</li> <li>• 0VA023Y - OPEN.</li> <li>• 0VA436Y - CLOSED.</li> </ul> </li> <li>• Plenum C: <ul style="list-style-type: none"> <li>• 0VA03CF - RUNNING.</li> <li>• 0VA072Y - OPEN.</li> <li>• 0VA438Y - CLOSED.</li> </ul> </li> </ul> </li> </ul> </li> <li>• Verify FHB ventilation aligned for emergency operation at 0PM02J: <ul style="list-style-type: none"> <li>• 0VA04CB – RUNNING.</li> <li>• 0VA055Y - OPEN.</li> <li>• 0VA062Y - OPEN.</li> <li>• 0VA435Y – CLOSED.</li> </ul> </li> <li>• Secure all running HD pumps.</li> <li>• Initiate periodic monitoring of Spent Fuel Cooling.</li> <li>• Notify US Attachment B complete/manual actions taken.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS pumps running at 1PM05J/1PM06J: <ul style="list-style-type: none"> <li>• BOTH CV pumps – NONE RUNNING (1B tripped).</li> <li>• BOTH RH pumps – RUNNING.</li> <li>• SI pumps – 1A SI pump RUNNING. <ul style="list-style-type: none"> <li>• Manually START 1B SI pump.</li> </ul> </li> </ul> </li> <li>• Verify the following at 1PM06J: <ul style="list-style-type: none"> <li>• RCFCs running in accident mode. <ul style="list-style-type: none"> <li>• Group 2 RCFC accident mode status light lit.</li> </ul> </li> <li>• CNMT Phase A valves closed – NO. <ul style="list-style-type: none"> <li>• Manually actuate Phase A.</li> </ul> </li> </ul> </li> </ul> <p><b>Close containment isolation valves such that at least one valve is closed on each Phase A penetration before the end of the scenario. (Westinghouse CT-11) (K/A number APE069AA1.01 importance 3.5/3.7)</b></p> <ul style="list-style-type: none"> <li>• <b>Manually close 1CV8100 and/or 1CV8112.</b></li> <li>• Manually close the following valves: <ul style="list-style-type: none"> <li>• 1FP010</li> <li>• 1CV8152/8160</li> <li>• 1IA065/066</li> <li>• 1PS228A, 228B, 229A &amp; 229B</li> <li>• 1PR001A/B</li> </ul> </li> </ul>

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Scenario <b>NRC 3</b>		Event No. 9 & 10
Event Description: Feed line break inside containment & loss of heat sink/1B CV pump trip		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• Verify Cnmt Vent isolation: <ul style="list-style-type: none"> <li>• Group 6 Cnmt Vent Isol monitor lights – LIT.</li> </ul> </li> <li>• Verify AF system: <ul style="list-style-type: none"> <li>• AF pumps – Neither RUNNING. <ul style="list-style-type: none"> <li>◦ Attempt manual start of BOTH AF pumps.</li> <li>◦ Dispatch EO to BOTH AF pumps.</li> </ul> </li> <li>• AF isolation valves – 1AF13A-H OPEN.</li> <li>• AF flow control valves - 1AF005A-D OPEN.</li> </ul> </li> <li>• Verify CC pumps running: <ul style="list-style-type: none"> <li>• BOTH CC pumps – RUNNING.</li> </ul> </li> <li>• Verify SX pumps running: <ul style="list-style-type: none"> <li>• BOTH SX pumps – RUNNING.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if Main Steamlines Should Be Isolated: <ul style="list-style-type: none"> <li>• 1C S/G pressure &lt; 640 psig at 1PM04J.</li> <li>• CNMT pressure &gt; 8.2 psig at 1PM06J.</li> <li>• Verify MSIV &amp; MSIV bypass valves – CLOSED.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Determine and announce containment is adverse when containment pressure rises above 5 psig.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check if CS is required. <ul style="list-style-type: none"> <li>• CNMT pressure remained &lt; 20 psig.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Verify total AF flow: <ul style="list-style-type: none"> <li>• AF flow &lt; 500 gpm.</li> <li>• Check SG levels &lt; 31% (attempt to start AF pumps previously performed). <ul style="list-style-type: none"> <li>◦ May CLOSE 1AF013C &amp; 1AF013G to isolate CST gravity flow to 1C SG feed line break.</li> </ul> </li> </ul> </li> </ul>
	CREW	Identify entry conditions for 1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK."

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Scenario No:	<b>NRC 3</b>	Event No:	10
Event Description:	Feed line break inside containment/loss of heat sink		
Time	Position	Applicant's Actions or Behavior	
		<b>1BwFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK"</b>	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Request STA evaluation of status trees.</li> <li>Enter/implement 1BwFR-H.1 and direct operator actions of 1BwFR-H.1 to establish the following conditions:</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Check if secondary heat sink is required: <ul style="list-style-type: none"> <li>RCS pressure &gt; intact SG pressure.</li> <li>RCS temperature &gt; 350°F.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Check CV pump status: <ul style="list-style-type: none"> <li>CV pumps – NONE RUNNING.</li> <li>STOP all RCPs.</li> <li>GO TO step 14 (bleed and feed).</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Establish RCS feed path: <ul style="list-style-type: none"> <li>Actuate SI.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Verify RCS feed path: <ul style="list-style-type: none"> <li>BOTH SI pumps - RUNNING.</li> <li>Group 2 cold leg injection monitor lights required for operating ECCS pumps – LIT.</li> </ul> </li> </ul>	
	ATC  [CT-46]	<ul style="list-style-type: none"> <li>Establish RCS bleed path: <ul style="list-style-type: none"> <li>PORV isolation valves – 1RY8000A &amp; 1RY8000B energized &amp; open.</li> </ul> </li> </ul> <p><b>Initiate RCS bleed and feed so that the RCS depressurizes sufficiently for SI pump injection to occur. (Westinghouse CT-46) (K/A number EPEE05EA1.1 importance 4.1/4.0)</b></p> <ul style="list-style-type: none"> <li>Open BOTH PZR PORVs (1RY455A &amp; 1RY456).</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Verify adequate RCS bleed path: <ul style="list-style-type: none"> <li>PZR PORVs – BOTH OPEN.</li> <li>PORV isolation valves – BOTH OPEN.</li> </ul> </li> </ul>	
		<p><b>EXAMINER'S NOTE: (1) All critical tasks are complete at this point; the scenario may be terminated at Lead Examiner's discretion.</b></p> <p><b>(2) The following steps address restoring feedwater to the SGs.</b></p>	

Comments: \_\_\_\_\_

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Scenario <b>NRC 3</b>		Event 10
No:		No.
Event Description: Feed line break inside containment/loss of heat sink		
Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>Verify ESF equipment actuations. <ul style="list-style-type: none"> <li>Check if ESF actuation verification steps of 1BwEP-0 have been performed.</li> </ul> </li> </ul>
	CREW	<ul style="list-style-type: none"> <li>Maintain RCS heat removal: <ul style="list-style-type: none"> <li>Maintain ECCS flow.</li> <li>Maintain PZR PORVs – BOTH OPEN.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Reset SI, if necessary: <ul style="list-style-type: none"> <li>Depress BOTH SI Reset Pushbuttons at 1PM06J.</li> <li>Verify SI ACTUATED PERMISSIVE light NOT lit at 1PM05J.</li> <li>Verify AUTO SI BLOCKED PERMISSIVE light LIT at 1PM05J.</li> </ul> </li> <li>Reset Cnmt isolation: <ul style="list-style-type: none"> <li>Reset Phase A.</li> </ul> </li> <li>Establish IA to Cnmt: <ul style="list-style-type: none"> <li>Verify any SAC running.</li> <li>Open 1IA065 and 1IA066.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Check if CS should be stopped: <ul style="list-style-type: none"> <li>CS pumps – NONE RUNNING.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>Verify cold leg recirc capability: <ul style="list-style-type: none"> <li>BOTH RH pumps - RUNNING.</li> <li>1SI8811A/B valve position lights – ENERGIZED.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Try to establish AF to at least one SG: <ul style="list-style-type: none"> <li>Check blowdown isolation and sample valves closed: <ul style="list-style-type: none"> <li>1SD005A-D &amp; 1SD002A-H.</li> </ul> </li> <li>Prior to initiating feed flow, review Attachment B.</li> <li>Check annunciator AF PUMP SX SUCT VLVS ARMED (1-3-E7) – NOT LIT.</li> <li>Check 1AF004A &amp; B – OPEN.</li> <li>Check AF pumps – NONE RUNNING (1A AF pump has ground overcurrent flag and motor damage; 1B AF pump has large lube oil leak and engine damage).</li> <li>AF isolation valves, 1AF013A-H – OPEN.</li> <li>AF flow control valves, 1AF005A-H – THROTTLED/OPEN.</li> <li>Check AF flow – NOT ESTABLISHED.</li> </ul> </li> </ul>

Comments: \_\_\_\_\_

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Scenario No:	<b>NRC 3</b>	Event No:	10
Event Description:	Feed line break inside containment/loss of heat sink		
Time	Position	Applicant's Actions or Behavior	
	BOP	<ul style="list-style-type: none"> <li>• Prepare FW system for restoration: <ul style="list-style-type: none"> <li>• Check CD/CB pumps – at least ONE RUNNING.</li> <li>• Place FW valves in manual at 0% demand. <ul style="list-style-type: none"> <li>• 1FW510-540.</li> <li>• 1FW510A-540A.</li> <li>• 1FW034A-D.</li> </ul> </li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Defeat FW isolation: <ul style="list-style-type: none"> <li>• Dispatch U-2 NSO to remove FW isolation fuses.</li> <li>• FW isolation fuses FU-24 and FU-27 removed at: <ul style="list-style-type: none"> <li>• 1PA27J.</li> <li>• 1PA28J.</li> </ul> </li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Establish main FW flow to at least one SG: <ul style="list-style-type: none"> <li>• Open 1FW035A/B/D.</li> <li>• Check FW pumps available.</li> <li>• Check CD/CB pumps – at least TWO RUNNING.</li> <li>• Prepare startup FW pump for operation: <ul style="list-style-type: none"> <li>• Check Bus 159 – ENERGIZED.</li> <li>• Locally start aux oil pump.</li> <li>• Open startup FW pump discharge valve – 1FW059.</li> <li>• Open startup FW pump recirc valve – 1FW076 (place C/S in modulate).</li> <li>• Close main FW pump recirc valves – 1FW012A, B &amp; C.</li> </ul> </li> </ul> </li> <li>• Start startup FW pump.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Prior to initiating FW flow, review Attachment B.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Establish main FW flow to at least one SG: <ul style="list-style-type: none"> <li>• Throttle 1FW034A/B/D to desired flowrate.</li> <li>• Maintain hotwell level &gt; 7 inches.</li> <li>• Check SG WR levels rising.</li> </ul> </li> </ul>	
		<b>EXAMINER'S NOTE: Terminate the scenario at Lead Examiner's discretion.</b>	

(Final)

Comments: \_\_\_\_\_  
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Simulation Facility Braidwood Scenario Operating Test No.: **151 NRC**  
 No.:  
**NRC 4**  
 Examiners: \_\_\_\_\_ Applicant: \_\_\_\_\_ SRO  
 \_\_\_\_\_ ATC  
 \_\_\_\_\_ BOP

Initial Conditions: IC-16

Turnover: Unit 1 is at 53% power, steady state, equilibrium xenon, MOL. Online risk is green. Following completion of turnover, the crew will perform 1BwOSR 3.7.4.1 "MAIN STEAM SYSTEM ISOLATION 1MS018A/B/C/D VALVE TRAVEL AND INDICATION 18 MONTH SURVEILLANCE." Once the surveillance is complete, the SM has directed ramping Unit 1 to 938 MW at 3 MW/min.

Event No.	Malf. No.	Event Type*	Event Description
	IMF CV32B TRGSET 1 "ZLO1SI01PA(3) = = 1" IMF CV01A (1 0) TRGSET 2 "ZAO1PI524A < 0.46" IMF TH03B (2 10) 600 60		1B CV pump auto start failure 1A CV pump trip on 1A SI pump start  1A CV pump trips on 1A SI pump start  1B SGTR when 1B SG pressure < 600 psig
1	TRGSET 3 "ZAO1PKMS042A > 0.90" IMF PB2411 (3 0) ON IMF PB2412 (3 0) ON IOR ZLO1MS018B2 (3 0) ON IOR ZLO1MS018B1 (3 0) ON IOR ZAO1ZIMS010 (3 0) 90 TRGSET 2 "ZDI1MS018B == 0" TRG 2 "DOR ZAO1ZIMS010"	N-BOP, US TS-US	1BwOSR 3.7.4.1, 1MS018A/B/C/D Surv with 1MS018B valve failure.
2	None	R-ATC, US	Raise power from 53% to 938 MW
3	IMF TH10B 100 15	C-ATC, US	1RY455C spray valve fails open in auto
4	IMF RX13A 0	C-ATC, US TS-US	PZR level channel, 1LT-459, fails low
5	IMF RX29B 100 30	I-BOP, US	1FW520 controller fails high in auto
6	IMF FW17 10 30	I-BOP, US	HD Tank level controller failure in auto
7	IOR ZDI1MS001B CLS IMF MS03B 100 IMF MS03F 100 IMF MS03J 100	M-ALL	1B MSIV fails closed causing 1B SG safety valves to stick open
8	Preload	C-ALL	1A CV pump trips/1B CV pump fails to auto start
9	Preload	M-ALL	1B SGTR (600 gpm) (faulted and ruptured SG)

\*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

## SCENARIO OVERVIEW

Unit 1 is at 53% power, steady state, equilibrium xenon, MOL. Online risk is green. Following completion of turnover, the crew will perform 1BwOSR 3.7.4.1 "MAIN STEAM SYSTEM ISOLATION 1MS018A/B/C/D VALVE TRAVEL AND INDICATION 18 MONTH SURVEILLANCE." Once the surveillance is complete, the SM has directed ramping Unit 1 to 938 MW at 3 MW/min.

**After completing shift turnover and relief**, the BOP performs 1BwOSR 3.7.4.1. The 1B SG PORV, 1MS018B, will fail the test due to a broken hydraulic line when the valve is stroked open. The Unit Supervisor will enter Tech Spec 3.7.4 Condition A and Tech Spec 3.6.3 Condition C. 1MS019B will remain closed to comply with TS 3.6.3 Condition C. 1MS018B will remain unavailable for the remainder of the scenario. The crew should inform the SM following the 1MS018B failure.

**After the 1MS018B failure has been addressed**, the crew will commence a ramp to 938 MW at 3 MW/min.

**After a measurable change in power**, 1PK-455C, Pressurizer Spray Valve controller, will fail to 100% demand position. 1RY455C will fail full open and pressurizer pressure will drop. The ATC will take manual control of 1PK-455C per hard card 1BwPR 1-12-RY and lower demand to close the pressurizer spray valve. Tech Spec 3.4.1 Condition A will apply if pressurizer pressure drops below 2209 psig.

**After the 1PK-455C failure has been addressed**, the controlling PZR level channel, 1LT-459, will fail low. The crew will implement 1BwOA INST-2 and take actions to restore PZR level control and stabilize plant conditions. Technical Specification 3.3.1 Conditions A and K apply (Tech Spec 3.3.3 and 3.3.4 for Accident Monitoring and Remote Shutdown Panel minimum channel requirements are still met).

**After the failed PZR level channel has been addressed**, 1FK-520, Feed Reg Valve 1FW520 Controller, will fail to 100% demand. 1FW520, 1B FRV, will fully open and 1B SG level will rise. The crew will take actions per hard card 1BwPR 1-15-SG to stabilize the plant by taking manual control of the 1B FRV controller.

**After the 1FK-520 failure is addressed**, Heater Drain Tank (HDT) Level Controller, 1LK-HD009A, will fail to 0% demand. The 1HD046A/B valves will throttle close and HDT level will rise. The BOP will take actions to stabilize the plant by taking manual control of the 1LK-HD009A controller.

**After the HDT Level Controller failure is addressed**, the 1B MSIV fails closed causing three SG safety valves on the 1B SG to stick open resulting in a faulted SG. SG pressure will drop and a manual reactor trip will be required. The crew will implement 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION." When safety injection is actuated, the 1A CV pump will trip. The 1B CV pump must be manually started to establish high head ECCS flow. After determining 1B SG secondary pressure boundary is not intact, the crew will transition to 1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION." When 1B SG pressure drops to 600 psig, a SGTR will occur on the 1B SG, causing a faulted/ruptured SG. The crew will complete isolation of 1B SG and transition to 1BwEP-3 "STEAM GENERATOR TUBE RUPTURE" based on secondary radiation trends on the 1B SG. In addition, the crew will recognize 1B SG pressure does not drop to zero and lowering pressurizer level/pressure will indicate a SGTR (alternate indications). After determining the ruptured SG pressure is less than 320 psig, the crew will transition 1BwCA-3.1 "SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED."

**Completion criteria** is completion of step 8 to stop the RH pumps in 1BwCA-3.1.

### Critical Tasks

1. Manually start the 1B CV pump prior to completion of step 6 of 1BwEP-0.  
(Westinghouse – CT-6) (K/A number - 013000A4.01 importance 4.5/4.8)
2. Isolate 1B Steam Generator prior to completing step 4 of 1BwEP-2.  
(Westinghouse – CT-18) (K/A number - APE040AA1.10 importance 4.1/4.1)

## SIMULATOR SETUP GUIDE

- Verify/perform TQ-BR-201-0113, BRAIDWOOD TRAINING DEPARTMENT SIMULATOR EXAMINATION SECURITY ACTIONS CHECKLIST.
- Establish the conditions of IC-16, 53% power, steady state, equilibrium xenon.
- Verify/place 0A and 0C VA plenums in service, 0B VA plenum in standby.
- Complete items on Simulator Ready for Training Checklist.
- Verify/remove any Equipment Status Tags and Danger Tags not applicable to the scenario.
- Place simulator in RUN (allow simulator to run during board walk down and turnover).
- Run **caep 151 NRC 4 SETUP** from disk and verify the following actuate:
  - **IMF CV32B**
  - **TRGSET 1 "ZLO1SI01PA(3) = = 1"**
  - **IMF CV01A (1 0)**
  - **TRGSET 2 "ZAO1PI524A < 0.46"**
  - **IMF TH03B (2 10) 600 60**
- See EVENT 1 and run the event 1 cae during simulator setup.
- Provide examinees with turnover sheets.

**Event 1: 1BwOSR 3.7.4.1 with 1MS018B valve failure (Tech Spec).**

Run **caep 151 NRC 4 EVENT 1** from disk and verify the following actuate:

- **TRGSET 3 "ZAO1PKMS042A > 0.90"**
- **IMF PB2411 (3 0) ON**
- **IMF PB2412 (3 0) ON**
- **IOR ZLO1MS018B2 (3 0) ON**
- **IOR ZLO1MS018B1 (3 0) ON**
- **IOR ZAO1ZIMS010 (3 0) 90**
- **TRGSET 4 "ZDI1MS018B == 0"**
- **TRG 4 "DOR ZAO1ZIMS010"**

When requested, as Equipment Operator, report you are standing by at the 1MS018B/C valves.

Report the following as an EO when prompted: "AS FOUND" position for 1MS019A/B/C/D is OPEN.

When requested to close 1MS019A/B/C/D insert the following:

- **IRF MS51 0** for 1MS019A.
- **IRF MS52 0** for 1MS019B.
- **IRF MS53 0** for 1MS019C.
- **IRF MS54 0** for 1MS019D.

As SM acknowledge the failure of 1MS018B, LCO 3.6.3, Condition C and LCO 3.7.4, Condition A entry, and requests for on-line risk assessment, maintenance support and IR initiation. If asked, 1BwOSR 3.6.3.5.MS-1 is NOT required to be performed.

If asked, as EO, report 1MS018B has a broken hydraulic line and a small puddle of hydraulic fluid is present beneath the valve. The hydraulic pump is running. If asked 1MS018B is 90% open locally.

After the BOP takes the 1MS018B C/S to CLOSE, if asked as the EO, report 1MS018B is 90% open & its hydraulic pump is NOT running.

As WEC supervisor, acknowledge request for EST for 1MS018B C/S, if EST is requested.

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**Event 2: Raise power to 938 MW at 3 MW/min.**

If ramp is not commenced immediately after the Tech Spec entry, call as TSO and request status of Unit 1 ramp to 938 MW.

Acknowledge as Chemistry/Rad Protection requests for samples (if required).

Acknowledge as Generation Dispatch the initiation of the ramp.

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**Event 3: 1PK-455C Pressurizer Spray Valve Controller failure.**

Insert **IMF TH10B 100 15** to fail 1RY455C controller to 100% demand over 15 seconds.

As SM, acknowledge the failure, LCO 3.4.1 Condition A entry and exit (if applicable), and requests for maintenance support, and IR initiation.

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**Events 4: PZR level channel 1LT-459 fails low.**

Insert **IMF RX13A 0** to fail 1LT-459 low.

As SM, if support requested for bypassing the bistable in AEER, report that AEER bistable is not to be bypassed until work analyst and NSO support can be obtained (in approx. 2 hours) and that the abnormal operating procedure should be continued.

Acknowledge as Shift Manager the failure, LCOAR entry, on-line risk assessment, EAL evaluation, request for maintenance support, and IR request.

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**Event 5: 1FW520 controller fails high in auto.**

Insert **IMF RX29B 100 30** to fail 1FK-520 controller to 100% demand over 30 seconds.

If dispatched as EO to investigate, wait one minute and report no visible damage to 1FW520. 1FW520 appears to be responding correctly in manual (if asked for feedback to manual ops).

Acknowledge as Shift Manager the failure, request for maintenance support, and IR request.

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**Event 6: HDT Level controller failure.**

Insert **IMF FW17 0 30** to fail the controller to 0% demand over 30 seconds.

If dispatched as EO to investigate, wait one minute and report no visible damage to 1HD046A or B valves. Report local operation/position of 1HD046A/B the same as MCR indication (if asked for feedback to manual valve operation).

Report local HD tank level same as MCR indication.

If dispatched as EO to investigate HDT rupture disk, report it is intact.

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**Event 7: 1B SG Safety valves stick open when 1B MSIV fails closed.**

Run **caep 151 NRC 4 EVENT 7** from disk and verify the following actuate:

**IOR ZDI1MS001B CLS**  
**IMF MS03B 100**  
**IMF MS03F 100**  
**IMF MS03J 100**

After faulted SG is diagnosed by crew OR two minutes after malfunction is inserted, report as security, steam flow from 1B/1C MSIV room safety valve tailpipes.

Acknowledge as SM procedure changes, Emergency Plan evaluations, and STA request.

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**Event 8: 1A CV pump trips/1B CV pump fails to auto start (preload).**

**Verify that the 1A CV pump trips when the 1A SI pump starts.**

If dispatched as EO to investigate 1A CV pump, report ground overcurrent flag at breaker cubicle.

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**Event 9: Faulted/ruptured 1B SG (preload).**

**Verify that MF TH03B inserts when 1B SG pressure drops below 600 psig.**

Acknowledge as SM procedure changes, Emergency Plan evaluations, and STA request.

After STA requested, as STA report CSF status.

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Scenario No:	<b>NRC 4</b>	Event No.	1
Event Description:	Perform 1BwOSR 3.7.4.1 "MAIN STEAM SYSTEM ISOLATION 1MS018A/B/C/D VALVE TRAVEL AND INDICATION 18 MONTH SURVEILLANCE"		
Time	Position	Applicant's Actions or Behavior	
	CUE	From turnover, perform 1BwOSR 3.7.4.1.	
	US	<ul style="list-style-type: none"> <li>• Direct BOP to perform 1BwOSR 3.7.4.1.</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Refer to 1BwOSR 3.7.4.1.</li> <li>• Verify/initial step 1, initial conditions.</li> <li>• Contact the EO at 1MS019B for initial position <u>and</u> record initial valve positions.</li> <li>• Direct the EO to close 1MS019B.</li> <li>• OPEN 1MS018B at 1PM04J.</li> <li>• Respond to Annunciator S/G 1B PORV TROUBLE (1-15-B10) alarm.</li> <li>• Identify/report trouble alarm on 1MS018B.</li> <li>• Refer to BwAR 1-15-B10.</li> <li>• Contact operator at 1MS018B for valve status. <ul style="list-style-type: none"> <li>○ Place 1MS018B C/S in close to stop hydraulic pump.</li> <li>○ Request Equipment Status Tag for 1MS018B C/S &amp; 1MS019B hand wheel.</li> </ul> </li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Identify entry conditions for Tech Spec 3.7.4 Condition A.</li> <li>• Identify entry conditions for Tech Spec 3.6.3 Condition C. <ul style="list-style-type: none"> <li>○ Direct operator to maintain 1MS019B closed.</li> <li>○ Inform SM of 1MS018B status, Tech Spec status, request IR, on-line risk assessment, maintenance support, and clearance order/EST for 1MS019B.</li> </ul> </li> </ul>	
		<p><b>EXAMINER'S NOTE: (1) After the actions for 1MS018B failure are complete and with Lead Examiner's concurrence, enter next event.</b></p> <p><b>(2) 1B S/G PORV LVDT meter de-energizes when its control switch is placed in close.</b></p>	

Comments: \_\_\_\_\_

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Scenario No:	<b>NRC 4</b>	Event No:	2
Event Description:	Raise power to 938 MW at 3 MW/min		
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>• If ramp is not commenced immediately after suspending the surveillance, call from TSO to request the status of the Unit 1 power ascension.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Acknowledge request to raise load to 938 MW at 3 MW/min.</li> <li>• Implement actions of 1BwGP 100-3. <ul style="list-style-type: none"> <li>○ Perform pre-job brief per HU-AA-1211 "PRE-JOB, HEIGHTENED LEVEL OF AWARENESS, INFREQUENT PLANT ACTIVITY, AND POST JOB BRIEFINGS" for load ramp.</li> </ul> </li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Direct raising load to 938 MW at 3 MW/min.</li> <li>○ Initiate Load Swing Instruction Sheet, 1BwGP 100-4T2.</li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>○ Review applicable Precautions, and Limitations and Actions (may have been done in PJB prior to starting scenario).</li> <li>○ May energize PZR heaters.</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Verify rod position and boron concentration.</li> <li>• Initiate dilution per BwOP CV-5.</li> <li>• Determine required PW volume from ReMA.</li> <li>○ <b>Dilute in automatic (PREFERRED):</b> <ul style="list-style-type: none"> <li>○ Determine required PW flowrate.</li> <li>○ Note as found setpoint on 1FK-111, PW Total Flow Controller Pot.</li> <li>○ Adjust setpoint on 1FK-111 to desired PW flowrate.</li> <li>○ Set 1FY-0111 PW Control Predet Counter, to desired PW volume.</li> <li>○ Control VCT level by adjusting 1LK-112 setpoint or manually controlling 1LK-112.</li> <li>○ Place MAKE-UP CONT SWITCH to STOP position.</li> <li>○ Set MODE SELECT to DIL/ALT DIL position.</li> <li>○ Place MAKE-UP CONT SWITCH to START.</li> <li>○ Verify proper operation of valves and PW makeup pump (1CV111B open, 1CV111A throttled, 1CV110B open (ALT DIL only), PW pump running, proper PW flow on recorder).</li> <li>○ When desired dilution completed, place MAKE-UP CONT SWITCH to STOP position.</li> <li>○ Verify the following (1CV111B close, 1CV111A close, 1CV110B close, PW pump remains running).</li> </ul> </li> </ul> <p>OR</p>	
	ATC	<ul style="list-style-type: none"> <li>○ <b>Batch dilution:</b> <ul style="list-style-type: none"> <li>○ Control VCT level by adjusting 1LK-112 setpoint or manually controlling 1LK-112.</li> <li>○ Reset PW Total Flow Totalizer to ZERO.</li> </ul> </li> </ul>	

Comments: \_\_\_\_\_

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Scenario <b>NRC 4</b>		Event 2
No:		No.
Event Description: Raise power to 938 MW at 3 MW/min		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>○ Open 1CV111B, if desired to dilute to VCT upper nozzle.</li> <li>○ Open 1CV110B, if desired to dilute to VCT outlet.</li> <li>○ Open 1CV111A.</li> <li>○ When desired amount of primary water added: <ul style="list-style-type: none"> <li>○ Close 1CV111A and verify/place control switch to AUTO.</li> <li>○ Close 1CV110B and verify/place control switch to AUTO.</li> <li>○ Close 1CV111B and verify/place control switch to AUTO.</li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>● Raise turbine load at 1PM02J or OWS drop 210 by performing the following: <ul style="list-style-type: none"> <li>● Select SETPOINT.</li> <li>● Enter 938 MW into REF DEMAND window.</li> <li>● Select left ENTER.</li> <li>● Verify correct value appears in REF DEMAND window.</li> <li>● Enter 3 MW/min into the RATE window.</li> <li>● Select right ENTER.</li> <li>● Select EXIT.</li> <li>○ Notify Control room team of pending ramp.</li> <li>● Select GO/HOLD.</li> <li>● Verify GO/HOLD illuminates orange.</li> <li>● Verify HOLD illuminates RED.</li> <li>● Select GO.</li> <li>● Verify GO illuminates RED while the main turbine ramps.</li> <li>● Verify main turbine load begins to rise.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>● Monitor reactor power and load ascension: <ul style="list-style-type: none"> <li>● Monitor NIs, Tave, <math>\Delta I</math>, PZR pressure/level at 1PM05J or PPC.</li> <li>● Monitor MW and DEHC system response at 1PM02J or OWS drop 210.</li> <li>● During dilution, monitor the following at 1PM05J or PPC: <ul style="list-style-type: none"> <li>● VCT level.</li> <li>● RCS Tave.</li> <li>○ PW/Total flow predet counter responding correctly.</li> <li>○ Verify dilution auto stops at preset value.</li> <li>○ Return Reactor Makeup Control System to automatic.</li> <li>○ Perform periodic control rod steps to maintain Tave and Delta I within boundaries.</li> </ul> </li> </ul> </li> </ul>
		<b>EXAMINER'S NOTE: After measurable change in power and with Lead Examiner's concurrence, enter next event.</b>

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Scenario No:	<b>NRC 4</b>	Event No:	3
Event Description:	1PK-455C, Pressurizer Spray Valve controller, fails to 100% demand		
Time	Position	Applicant's Actions or Behavior	
	CUE	<ul style="list-style-type: none"> <li>• 1RY455C valve position lights indicate full open.</li> <li>• Pressurizer pressure dropping.</li> <li>• Master Pressurizer Pressure Controller demand dropping.</li> <li>○ Annunciator PZR PRESS CONT DEV LOW HTRS ON (1-12-C1)</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Identify failure/report alarm on 1PM05J.</li> <li>• Perform the following actions per hard card 1BwPR 1-12-RY: <ul style="list-style-type: none"> <li>• Place 1PK-455C in manual.</li> <li>• Lower demand to close 1RY455C (adjust PZR pressure to pre-failed value).</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>○ Refer to BwARs as time permits.</li> <li>○ Hold load ramp, if requested.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Direct operator to close 1RY455C.</li> <li>○ Identify entry condition for Tech Spec 3.4.1 Condition A.</li> <li>○ Identify exit condition for Tech Spec 3.4.1 Condition A.</li> <li>○ May hold load ramp (if in progress).</li> </ul>	
	US	<ul style="list-style-type: none"> <li>○ Inform SM of 1PK-455C failure, Tech Spec status, request IR, on-line risk assessment and maintenance support.</li> </ul>	
		<p><b>NOTE: After the actions for 1PK-455C failure are complete and with Lead Examiner's concurrence, enter next event.</b></p>	

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Scenario <b>NRC 4</b>		Event <b>4</b>
No:		No.
Event Description: PZR level channel, 1LT-459, fails low		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator PZR LVL LOW HTRS OFF LTDWN SECURED (1-12-A4)</li> <li>• Annunciator PZR HTR TRIP (1-12-A5)</li> <li>• Annunciator PZR LEVEL CONT DEV LOW (1-12-B4)</li> <li>• PZR level, 1LI-459A/461, and charging flow rising.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Determine PZR level and/or charging header flow rising at 1PM05J.</li> <li>• Identify 1LI-459A is failed low. <ul style="list-style-type: none"> <li>• Report failure to US.</li> </ul> </li> <li>• Perform the following at 1PM05J: <ul style="list-style-type: none"> <li>• Place 1CV121 controller (1FK-121) or 1LK-459 in manual and control PZR level (minimize charging).</li> <li>• Verify automatic actions occurred (letdown isolated, heaters tripped off).</li> </ul> </li> <li>○ Reference BwARs as time permits.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Identify entry conditions for 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL."</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Notify Shift Manager of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Implement 1BwOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL," ATTACHMENT C "PRESSURIZER LEVEL CHANNEL FAILURE," and direct operator actions of 1BwOA INST-2 to establish the following conditions: <ul style="list-style-type: none"> <li>○ May hold load ramp (if in progress).</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check PZR level at 1PM05J: <ul style="list-style-type: none"> <li>• PZR level normal – NO.</li> <li>• Manually restore PZR level using 1LK-459 or 1FK-121.</li> <li>• Select operable PZR level control channel: <ul style="list-style-type: none"> <li>• Place PZR level control select C/S to CH 461/460 position.</li> </ul> </li> <li>• Select operable PZR level channel for PZR level recorder at 1PM05J: <ul style="list-style-type: none"> <li>• Verify PZR level channel to recorder select switch in CH-460 or CH-461 position.</li> </ul> </li> </ul> </li> <li>• Check letdown and PZR heaters at 1PM05J: <ul style="list-style-type: none"> <li>• Check PZR level &gt; 17% on 1LI-460A &amp; 1LI-461.</li> <li>• Check letdown flow established – NO, letdown isolated (1BwOA ESP-2 actions are on the next page).</li> </ul> </li> </ul>

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Scenario No:	<b>NRC 4</b>	Event No:	4
Event Description:	PZR level channel, 1LT-459, fails low		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• Check PZR heaters normal: <ul style="list-style-type: none"> <li>• PZR heaters available in auto.</li> </ul> </li> <li>• Check PZR level control in auto at 1PM05J: <ul style="list-style-type: none"> <li>• Verify/place the following components in AUTO: <ul style="list-style-type: none"> <li>• 1LK-459, Master PZR level controller.</li> <li>• 1FK-121, CV pumps flow control valve.</li> </ul> </li> </ul> </li> </ul>	
	BOP	<p><b>1BwOA ESP-2 "REESTABLISHING CV LETDOWN DURING ABNORMAL CONDITIONS"</b> Restore normal letdown using 1BwOA ESP-2 as directed by performing the following at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Check letdown isolated: <ul style="list-style-type: none"> <li>• Verify 1CV8149A, B, &amp; C, letdown orifice isolation valves - CLOSED.</li> <li>• Verify 1CV459 &amp; 1CV460, letdown line isolation valves - CLOSED.</li> </ul> </li> <li>• Check letdown flow path: <ul style="list-style-type: none"> <li>• Verify 1CV8401A, letdown HX 1A isolation valve - OPEN.</li> <li>• Verify 1CV8324A, charging to regen HX 1A isolation valve – OPEN.</li> <li>• Verify 1CV8389A, letdown to regen HX 1A isolation valve – OPEN.</li> <li>• Verify 1CV8152 &amp; 1CV8160, letdown line CNMT isolation valves – OPEN.</li> <li>• Verify BTRS mode select switch OFF light - LIT.</li> </ul> </li> <li>• Align letdown controllers: <ul style="list-style-type: none"> <li>• Place 1PK-131, letdown line pressure controller, in MANUAL and raise demand to 40%.</li> <li>• Place 1CC130A, letdown HX outlet temperature controller, in MANUAL and raise demand to 60%.</li> </ul> </li> <li>• Verify charging flow established: <ul style="list-style-type: none"> <li>• Verify 1CV8105 and 1CV8106, charging line CNMT isolation valves - OPEN.</li> <li>• Throttle 1CV182, charging header backpressure control valve, to establish 8-13 gpm RCP seal injection flow.</li> <li>• Place 1FK-121, in manual and operate 1FK-121 in manual to establish <math>\geq</math> 100 gpm charging flow on 1FI-121A.</li> </ul> </li> <li>• Establish letdown flow: <ul style="list-style-type: none"> <li>• OPEN 1CV459 &amp; 1CV460, letdown line isolation valves.</li> <li>• OPEN 1CV8149A/B/C, letdown orifice isolation valves, as necessary to establish 120 gpm letdown flow.</li> <li>• Lower demand on 1PK-131, letdown line pressure controller, to raise letdown pressure to approximately 360 psig on 1PI-131.</li> <li>• Operate 1FK-121 in manual to restore PZR level to normal operating band and maintain 8-13 gpm RCP seal injection flow.</li> </ul> </li> </ul>	

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Scenario No: <b>NRC 4</b>		Event No: <b>4</b>
Event Description: PZR level channel, 1LT-459, fails low		
Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• Lower demand on 1CC130A to control letdown temperature between 90° to 115°F on 1TI-130.</li> <li>• Place 1PK-131, letdown line pressure controller, in AUTO.</li> <li>• Place 1CC130A, letdown HX outlet temperature controller, in AUTO.</li> <li>• At the RM-11, verify 1PR06J rad monitor status is GREEN.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Determine Tech Spec 3.3.1 Conditions A and K are applicable. <ul style="list-style-type: none"> <li>○ Determine Tech Spec 3.3.3 and 3.3.4 are NOT applicable – minimum channels operable requirement is met.</li> </ul> </li> <li>• Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> </ul>
		<b>EXAMINER'S NOTE: After the actions for the pressurizer level channel failure are complete and with Lead Examiner's concurrence, insert next event.</b>

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Scenario No: <b>NRC 4</b>		Event No: <b>5</b>
Event Description: 1FW520 (1B FRV) controller fails high in auto		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• Annunciator S/G 1B FLOW MISMATCH STM FLOW LOW (1-15-B3)</li> <li>• 1FK-520 controller output failed high.</li> <li>• Feed flow rising on FW flow meters, 1FI-520A/521A.</li> <li>• 1B SG level rising on SG level meters, 1LI-527/528/529/557.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Determine 1B SG level rising.</li> <li>• Perform the following per hard card 1BwPR 1-15-SG at 1PM04J: <ul style="list-style-type: none"> <li>• Place 1FK-520 in manual.</li> <li>• Restore 1B SG level to pre-failed value.</li> <li>• Determine that 1B FRV controller failed in auto.</li> </ul> </li> <li>• Maintain 1B SG level by operating 1FK-520 in manual.</li> <li>• Report failure to US.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Recognize 1FK-520 output failed high.</li> <li>○ Reference BwARs as time permits.</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Direct/ensure BOP takes manual control of 1FK-520 and returns 1B SG level to normal.</li> <li>• Inform SM of 1FK-520 failure.</li> <li>○ May hold load ramp (if in progress).</li> </ul>
	US	<ul style="list-style-type: none"> <li>○ Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct controller failure.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>○ Crew may elect to base load 1FW520 and place 1FW520A in automatic per 1BwGP 100-3 Limitation E.4.g or BwOP FW-30.</li> </ul>
		<b>EXAMINER'S NOTE: After the actions for the 1FW520 controller failure are complete and with Lead Examiner's concurrence, insert next event.</b>

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Scenario No: <b>NRC 4</b>		Event No: <b>6</b>
Event Description: <b>HD Tank Level Controller Failure</b>		
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• HD tank level controller, 1LK-HD009A, output failed to 0%.</li> <li>• Lowering HD pump flows on 1FI-HD004/6.</li> <li>• Rising HD tank level on 1LI-HD009.</li> <li>• Annunciator HD TANK LEVEL HIGH LOW (1-17-E4)</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Recognize 1LK-HD009A output failed low (0%).</li> </ul>
	US	<ul style="list-style-type: none"> <li>• Direct/ensure BOP takes manual control of 1LK-HD009A and restore HD Tank level to normal.</li> <li>• Inform SM of HD Tank level controller failure.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Perform the following at 1PM03J: <ul style="list-style-type: none"> <li>• Place 1LK-HD009A, HD Tank Level Controller, in manual.</li> <li>• Raise demand on 1LK-HD009A.</li> <li>• Monitor HDT level and control 1HD046A/B position to restore HD Tank level to normal.</li> <li>• Maintain HD Tank level by operating 1LK-HD009A in manual. <ul style="list-style-type: none"> <li>○ Dispatch EO to 1HD046A/B valves.</li> </ul> </li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>○ Contact SM to perform risk assessment, initiate IR, and contact maintenance to investigate/correct instrument failure.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>○ Review BwARs as time permits.</li> </ul>
		<b>EXAMINER'S NOTE: After the actions for the HD tank level controller failure are complete and with Lead Examiner's concurrence, insert next event.</b>

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Scenario <b>NRC 4</b>		Event No. 7 & 8
Event Description:		1B MSIV closes causing 1B SG safety valves to stick open, 1A CV pump trips/1B CV pump fails to auto start
Time	Position	Applicant's Actions or Behavior
	CUE	<ul style="list-style-type: none"> <li>• 1B MSIV indicates closed.</li> <li>• Annunciator S/G 1B FLOW MISMATCH FW FLOW LOW (1-15-B4)</li> <li>• PZR pressure lowering.</li> <li>• Turbine MW output lowering.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Recommend/initiate a manual reactor trip.</li> <li>• Initiate a manual SI.</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>• Recognize indications of faulted SG. <ul style="list-style-type: none"> <li>○ Dispatch operators to look for steam leak.</li> <li>○ When report is received that 1B SG safeties are open, recognize that SG pressure is below safety valve lift setpoint.</li> </ul> </li> </ul>
	US	<ul style="list-style-type: none"> <li>• Direct a manual Rx trip.</li> <li>• Implement 1BwEP-0 "REACTOR TRIP OR SI."</li> <li>• Notify SM of plant status and procedure entry.</li> <li>• Request SM evaluation of Emergency Plan conditions.</li> <li>• Direct operator actions of 1BwEP-0 to establish the following conditions:</li> </ul>
	ATC	<p>Perform immediate operator actions of 1BwEP-0 at 1PM05J:</p> <ul style="list-style-type: none"> <li>• Verify reactor trip: <ul style="list-style-type: none"> <li>• Rod bottom lights - ALL LIT.</li> <li>• Reactor trip &amp; Bypass breakers - OPEN.</li> <li>• Neutron flux - DROPPING.</li> </ul> </li> </ul>
	BOP	<p>Perform immediate operator actions of 1BwEP-0 at 1PM02J:</p> <ul style="list-style-type: none"> <li>• Verify turbine trip: <ul style="list-style-type: none"> <li>• All Turbine throttle valves - CLOSED.</li> <li>• All Turbine governor valves - CLOSED.</li> </ul> </li> </ul>
	BOP	<p>Perform immediate operator actions of 1BwEP-0 at 1PM01J:</p> <ul style="list-style-type: none"> <li>• Verify power to 4KV busses: <ul style="list-style-type: none"> <li>• ESF Buses – BOTH ENERGIZED (141 &amp; 142).</li> </ul> </li> </ul>

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Scenario No:	<b>NRC 4</b>	Event No:	7 & 8
Event Description:	1B MSIV closes causing 1B SG safety valves to stick open, 1A CV pump trips/1B CV pump fails to auto start		
Time	Position	Applicant's Actions or Behavior	
	CREW	Recognize and respond to conditions requiring a Safety Injection in accordance with 1BwEP-0 "REACTOR TRIP OR SAFETY INJECTION," step 4: <ul style="list-style-type: none"> <li>• SG pressure cannot be maintained &gt; 640 psig.</li> <li>• Manually actuate SI from 1PM05J and 1PM06J.</li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>• Check SI Status:             <ul style="list-style-type: none"> <li>○ SI First OUT annunciator - LIT.</li> <li>○ SI ACTUATED Permissive Light - LIT.</li> <li>○ SI Equipment – AUTOMATICALLY ACTUATED.                 <ul style="list-style-type: none"> <li>○ Either SI pumps - RUNNING.</li> <li>○ Either CV pump to cold leg isolation valve OPEN – 1SI8801A/B.</li> </ul> </li> </ul> </li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>○ May choose to isolate 1B SG immediately due to possible personnel safety considerations.</li> <li>○ Isolate AF to 1B SG – CLOSE 1AF013B/F.</li> <li>○ Actuate Main Steam Isolation.</li> </ul>	
	US	<ul style="list-style-type: none"> <li>• Direct BOP to perform Attachment B of 1BwEP-0.</li> </ul>	
		<b>EXAMINER'S NOTE: US and ATC will continue in 1BwEP-0 while BOP is performing Attachment B.</b>	
	BOP	<b>1BwEP-0 ATTACHMENT B:</b> <ul style="list-style-type: none"> <li>• Verify FW isolated at 1PM04J:             <ul style="list-style-type: none"> <li>• FW pumps – TRIPPED.</li> <li>• FW isolation monitor lights – LIT.</li> <li>• FW pumps discharge valves - CLOSED (or going closed) 1FW002A-C.</li> </ul> </li> <li>• Verify DGs running at 1PM01J:             <ul style="list-style-type: none"> <li>• DGs – BOTH RUNNING</li> <li>• 1SX169A/B OPEN.</li> <li>• Dispatch operator locally to check operation.</li> </ul> </li> <li>• Verify Generator Trip at 1PM01J:             <ul style="list-style-type: none"> <li>• OCB 1-8 and 7-8 open.</li> <li>• PMG output breaker open.</li> </ul> </li> <li>• Verify Control Room ventilation aligned for emergency operations at 0PM02J:             <ul style="list-style-type: none"> <li>• VC Rad Monitors – LESS THAN HIGH ALARM SETPOINT.</li> <li>• Operating VC train equipment – RUNNING.                 <ul style="list-style-type: none"> <li>• 0B Supply fan.</li> <li>• 0B Return fan.</li> <li>• 0B M/U fan.</li> <li>• 0B Chilled water pump.</li> <li>• 0B Chiller.</li> </ul> </li> </ul> </li> </ul>	

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Scenario No:	<b>NRC 4</b>	Event No:	7 & 8
Event Description:	1B MSIV closes causing 1B SG safety valves to stick open, 1A CV pump trips/1B CV pump fails to auto start		
Time	Position	Applicant's Actions or Behavior	
		<ul style="list-style-type: none"> <li>• Operating VC train dampers – ALIGNED. <ul style="list-style-type: none"> <li>• M/U fan outlet damper – 0VC08Y NOT FULLY CLOSED.</li> <li>• 0B VC train M/U filter light – LIT.</li> <li>• 0VC09Y - OPEN.</li> <li>• 0VC313Y - CLOSED.</li> </ul> </li> <li>• Operating VC train Charcoal Absorber aligned for train B. <ul style="list-style-type: none"> <li>• 0VC44Y - CLOSED.</li> <li>• 0VC05Y - OPEN.</li> <li>• 0VC06Y - OPEN.</li> </ul> </li> <li>• Control Room pressure greater than +0.125 inches water on 0PDI-VC038.</li> <li>• Verify Auxiliary Building ventilation aligned for emergency operations at 0PM02J: <ul style="list-style-type: none"> <li>• Two inaccessible filter plenums aligned. <ul style="list-style-type: none"> <li>• Plenum A: <ul style="list-style-type: none"> <li>• 0VA03CB - RUNNING.</li> <li>• 0VA023Y - OPEN.</li> <li>• 0VA436Y - CLOSED.</li> </ul> </li> <li>• Plenum C: <ul style="list-style-type: none"> <li>• 0VA03CF RUNNING.</li> <li>• 0VA072Y - OPEN.</li> <li>• 0VA438Y - CLOSED.</li> </ul> </li> </ul> </li> <li>• Verify FHB ventilation aligned for emergency operation at 0PM02J: <ul style="list-style-type: none"> <li>• 0VA04CB - RUNNING</li> <li>• 0VA055Y - OPEN.</li> <li>• 0VA062Y - OPEN.</li> <li>• 0VA435Y – CLOSED.</li> </ul> </li> <li>• Secure all running HD pumps.</li> <li>• Initiate periodic monitoring of Spent Fuel Cooling.</li> <li>• Notify US Attachment B complete/manual actions taken.</li> </ul> </li></ul>	
	ATC  [CT-6]	<ul style="list-style-type: none"> <li>• Verify ECCS pumps running: <ul style="list-style-type: none"> <li>• CV pumps - NONE RUNNING.</li> </ul> </li> <li>• <b>Manually start the 1B CV pump prior to completion of step 6 of 1BwEP-0. (Westinghouse – CT-6) (K/A number - 013000A4.01 importance 4.5/4.8)</b> <ul style="list-style-type: none"> <li>• <b>Manually start the 1B CV pump.</b></li> <li>• Both RH pumps - RUNNING.</li> <li>• Both SI pumps - RUNNING.</li> </ul> </li> </ul>	

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Scenario No:	<b>NRC 4</b>	Event No:	7 & 8
Event Description:	1B MSIV closes causing 1B SG safety valves to stick open, 1A CV pump trips/1B CV pump fails to auto start		
Time	Position	Applicant's Actions or Behavior	
	ATC	<ul style="list-style-type: none"> <li>• Verify RCFCs running in Accident Mode. <ul style="list-style-type: none"> <li>• Group 2 RCFC Accident Mode lights - LIT.</li> </ul> </li> <li>• Verify Phase A isolation. <ul style="list-style-type: none"> <li>• Group 3 Cnmt Isol monitor lights - LIT.</li> </ul> </li> <li>• Verify Cnmt Vent isolation. <ul style="list-style-type: none"> <li>• Group 6 Cnmt Vent Isol monitor lights - LIT.</li> </ul> </li> <li>• Verify AF system: <ul style="list-style-type: none"> <li>• BOTH AF pumps – RUNNING.</li> <li>• AF isolation valves – 1Af013A-H OPEN.</li> <li>• AF flow control valves – 1AF005A-H throttled OPEN.</li> </ul> </li> <li>• Verify CC pumps running: <ul style="list-style-type: none"> <li>• BOTH CC pumps – RUNNING.</li> </ul> </li> <li>• Verify SX pumps running: <ul style="list-style-type: none"> <li>• BOTH SX pumps – RUNNING.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Check if Main Steamlines Should Be Isolated: <ul style="list-style-type: none"> <li>• Check SG pressures: <ul style="list-style-type: none"> <li>○ SG pressures &gt; 640 psig – continue in 1BwEP-0. <ul style="list-style-type: none"> <li>• SG pressures &lt; 640 psig – verify MSIVs and MSIV bypass valves closed.</li> </ul> </li> </ul> </li> <li>• CNMT pressure &lt; 8.2 psig.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Check if CS is required. <ul style="list-style-type: none"> <li>• CNMT pressure remained &lt; 20 psig.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>• Verify total AF flow: <ul style="list-style-type: none"> <li>• AF flow &gt; 500 gpm.</li> <li>• Check S/G NR levels – NOT rising in an uncontrolled manner.</li> </ul> </li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>• Verify ECCS valve alignment: <ul style="list-style-type: none"> <li>• Group 2 Cold Leg Injection monitor lights required for injection – LIT.</li> </ul> </li> <li>• Verify ECCS flow: <ul style="list-style-type: none"> <li>• High head SI flow &gt;100 gpm (1FI-917).</li> <li>• RCS pressure &lt; 1700 psig. <ul style="list-style-type: none"> <li>• SI pump discharge flows &gt; 200 gpm.</li> </ul> </li> <li>• RCS pressure &lt; 325 psig.</li> </ul> </li> </ul>	

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Scenario <b>NRC 4</b>		Event No. 7 & 8
Event Description:		1B MSIV closes causing 1B SG safety valves to stick open, 1A CV pump trips/1B CV pump fails to auto start
Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"> <li>• Check PZR PORVs and spray valves: <ul style="list-style-type: none"> <li>• PORVs CLOSED.</li> <li>• PORV isolation valves – BOTH ENERGIZED.</li> <li>• PORV relief paths – BOTH PORVs in AUTO, PORV isolation valves OPEN.</li> <li>• Normal spray valves CLOSED.</li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check RCS temperatures: <ul style="list-style-type: none"> <li>○ ANY RCP running. <ul style="list-style-type: none"> <li>• RCS Tave stable at or trending to 557°F - NO. <ul style="list-style-type: none"> <li>○ Throttle AF flow.</li> <li>○ Isolate AF flow to 1B SG.</li> </ul> </li> </ul> </li> <li>○ NO RCPs running. <ul style="list-style-type: none"> <li>• RCS cold leg temperature stable at or trending to 557°F - NO. <ul style="list-style-type: none"> <li>○ Throttle AF flow.</li> <li>○ Isolate AF flow to 1B SG.</li> </ul> </li> </ul> </li> </ul> </li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Check status of RCPs: <ul style="list-style-type: none"> <li>• ALL RCPs - RUNNING.</li> <li>• Check RCP trip criteria. <ul style="list-style-type: none"> <li>○ RCS pressure &gt; 1425 psig – continue in 1BwEP-0.</li> <li>○ RCS pressure &lt; 1425 psig: <ul style="list-style-type: none"> <li>• Verify high head injection flow (1FI-917) &gt; 100 gpm.</li> <li>• Trip ALL RCPs.</li> </ul> </li> </ul> </li> </ul> </li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Check if SG secondary pressure boundaries are intact: <ul style="list-style-type: none"> <li>• Check NO SG depressurizing uncontrollably or completely depressurized. <ul style="list-style-type: none"> <li>• 1B SG pressure dropping in an uncontrolled manner.</li> </ul> </li> </ul> </li> </ul>
	CREW	Transition to 1BwEP-2 “FAULTED STEAM GENERATOR ISOLATION.”

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Scenario No:	<b>NRC 4</b>	Event No:	9
Event Description:	1B SGTR (600 gpm), faulted/ruptured 1B SG		
Time	Position	Applicant's Actions or Behavior	
		<b>1BwEP-2 "FAULTED STEAM GENERATOR ISOLATION"</b>	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Request STA evaluation of status trees.</li> <li>Enter/implement 1BwEP-2 and direct operator actions of 1BwEP-2 to establish the following conditions:</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check MS isolation: <ul style="list-style-type: none"> <li>All MSIVs and bypass valves - CLOSED.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check if any SG secondary pressure boundary is intact: <ul style="list-style-type: none"> <li>1A, 1C &amp; 1D SG pressures stable.</li> </ul> </li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>Identify faulted SG: <ul style="list-style-type: none"> <li>1B SG pressure lowering in an uncontrolled manner (1B SG indicates steam flow with its MSIV and MSIV bypass valve closed).</li> </ul> </li> </ul>	
	BOP  [CT-18]	<ul style="list-style-type: none"> <li>Isolate 1B Steam Generator: <b>Isolate 1B Steam Generator prior to completing step 4 of 1BwEP-2. (Westinghouse – CT-18) (K/A number - APE040AA1.10 importance 4.1/4.1)</b> <ul style="list-style-type: none"> <li>Verify/Close 1AF013B &amp; F – may have been closed at step 15 of 1BwEP-0.</li> <li>Check FW to faulted SG isolated (2nd row of FWI monitor lights LIT).</li> <li>Verify 1MS018B closed.</li> <li>Verify 1SD002E &amp; F closed.</li> <li>Verify 1SD005C closed.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check AF Pump Suction Pressure: <ul style="list-style-type: none"> <li>Annunciator AF PUMP SX SUCT VLVS ARMED (1-3-E7) – NOT LIT.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Check Secondary Radiation: <ul style="list-style-type: none"> <li>Reset Phase A at 1PM06J.</li> <li>OPEN 1SD005A-D at 1PM11J.</li> <li>Request Chemistry to periodically sample SGs for activity.</li> <li>Check secondary radiation trends: <ul style="list-style-type: none"> <li>1B Main Steam Line radiation abnormal on PPC or RM-11.</li> </ul> </li> </ul> </li> </ul>	
	CREW	Transition to 1BwEP-3 "STEAM GENERATOR TUBE RUPTURE."	

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Scenario No:	<b>NRC 4</b>	Event No:	9
Event Description:	1B SGTR (600 gpm), faulted/ruptured 1B SG		
Time	Position	Applicant's Actions or Behavior	
		<b>1BwEP-3 "STEAM GENERATOR TUBE RUPTURE"</b>	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Enter/implement 1BwEP-3 and direct operator actions of 1BwEP-3 to establish the following conditions:</li> </ul>	
	ATC	<ul style="list-style-type: none"> <li>Check Status of RCPs: <ul style="list-style-type: none"> <li>RCPs – NONE running – tripped earlier when RCP trip criteria met.</li> </ul> </li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Identify ruptured SG 1B: <ul style="list-style-type: none"> <li>1B Main steam line rad monitors ABNORMAL for plant conditions.</li> </ul> </li> <li>Isolate flow from ruptured SG: <ul style="list-style-type: none"> <li>Verify 1MS018B in auto and closed. (C/S may be in CLOSE, 1MS018B failed 90% open, 1MS019B closed).</li> <li>Verify 1SD002E &amp; F CLOSED.</li> <li>Verify MSIV and MSIV bypass valve for 1B SG CLOSED.</li> </ul> </li> <li>Check ruptured SG level - Narrow Range level &lt; 10%: <ul style="list-style-type: none"> <li>Do not feed 1B SG per Caution prior to step. <ul style="list-style-type: none"> <li>Verify/close 1AF013B &amp; F - previously closed in 1BwEP-0 OR 1BwEP-2.</li> </ul> </li> <li>Set 1AF005B and 1AF005F pot demand = 0%.</li> </ul> </li> </ul>	
	CREW	<ul style="list-style-type: none"> <li>Determine ruptured SG pressure &lt; 320 psig.</li> </ul>	
		Transition to 1BwCA-3.1 "SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED."	
	US	<ul style="list-style-type: none"> <li>Notify SM of plant status and procedure entry.</li> <li>Request SM evaluation of Emergency Plan conditions.</li> <li>Enter/implement 1BwCA-3.1 and direct operator actions of 1BwCA-3.1 to establish the following conditions:</li> </ul>	
	BOP	<ul style="list-style-type: none"> <li>Reset SI: <ul style="list-style-type: none"> <li>Depress both SI reset pushbuttons.</li> <li>Verify SI actuated permissive light – NOT LIT.</li> <li>Verify auto SI blocked permissive light – LIT.</li> </ul> </li> <li>Reset CNMT isolation/establish IA to containment: <ul style="list-style-type: none"> <li>Reset Phase A (performed in 1BwEP-2).</li> <li>Check a station air compressor is running at 0PM01J.</li> <li>OPEN 1IA065 and 1IA066 at 1PM11J.</li> </ul> </li> </ul>	

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Scenario No:	<b>NRC 4</b>	Event No:	9
Event Description:	1B SGTR (600 gpm), faulted/ruptured 1B SG		
Time	Position	Applicant's Actions or Behavior	
	BOP	<ul style="list-style-type: none"> <li>• Verify all AC buses energized by offsite power: <ul style="list-style-type: none"> <li>• All 4 KV ESF buses energized.</li> <li>• All 4 KV non-ESF buses energized.</li> <li>• All 6.9 KV buses energized.</li> </ul> </li> <li>• De-energize PZR Heaters: <ul style="list-style-type: none"> <li>• Place all B/U heaters contactors to OFF.</li> <li>• Place variable heater control switch in AFTER TRIP. <ul style="list-style-type: none"> <li>○ Consult with SM (TSC) for recommended minimum PZR level to keep PZR heaters covered.</li> </ul> </li> </ul> </li> <li>• Check if CS should be stopped: <ul style="list-style-type: none"> <li>• CS pumps – NONE running.</li> </ul> </li> <li>• Check ruptured SG level: <ul style="list-style-type: none"> <li>• 1B SG NR level &lt; 10% - do not feed 1B SG per Caution prior to step.</li> </ul> </li> <li>• Check if RH pumps should be stopped: <ul style="list-style-type: none"> <li>• 1SI8812A &amp; B open (aligned to RWST).</li> <li>• RCS pressure &gt; 325 psig and stable/rising. <ul style="list-style-type: none"> <li>○ Stop both RH pumps and place in standby (if conditions met).</li> </ul> </li> </ul> </li> </ul>	
		<b>EXAMINER'S NOTE: Terminate the scenario at Lead Examiner's discretion.</b>	

(Final)

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